

# MARINE REVIEW.

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CLEVELAND, O., AND CHICAGO, ILL., DEC. 14, 1893.

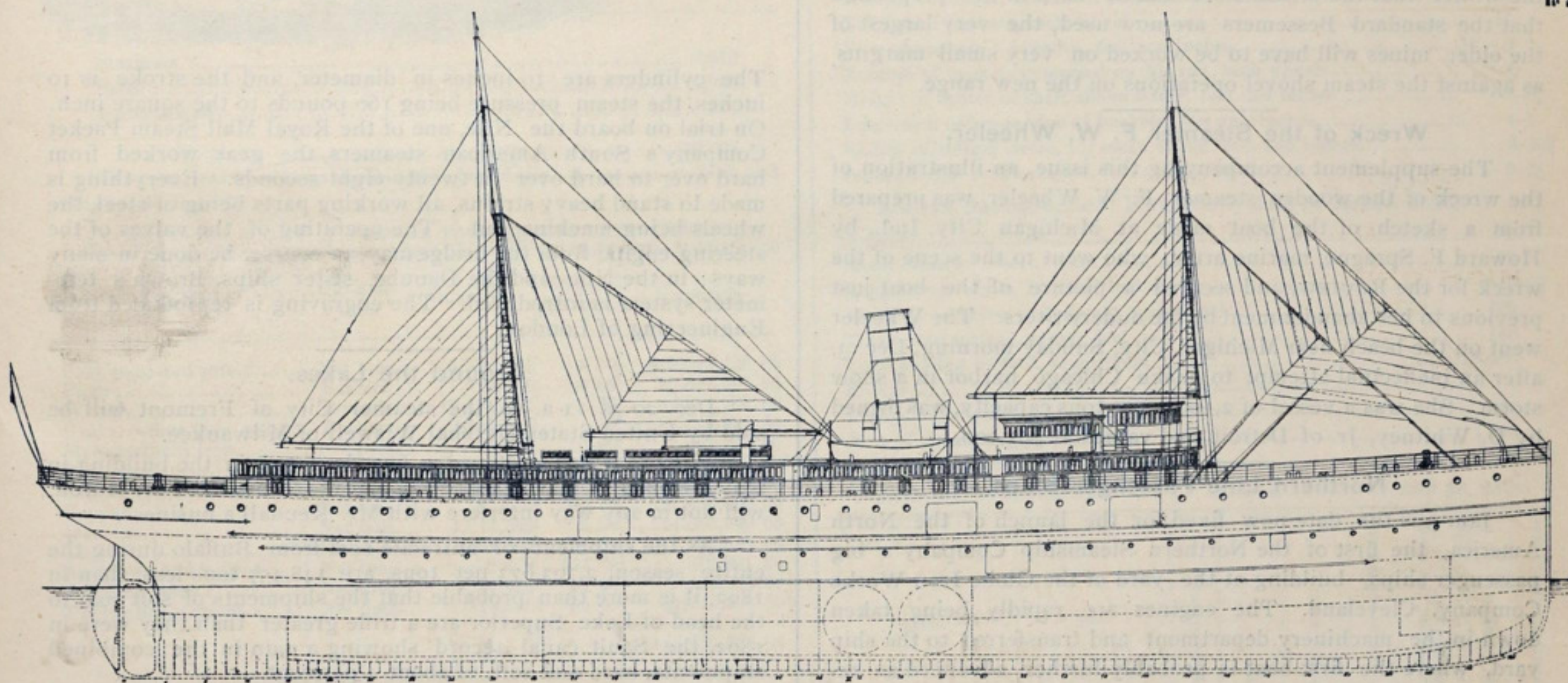
No. 24.

## Passenger and Freight Steamer Gloucester.

Another steel passenger and freight steamer recently built for Atlantic coast service, the Gloucester, is worthy of more than passing notice. This boat was constructed by the Maryland Steel Company of Sparrow's Point, Md., for the Boston line of the Merchants' and Miners' Transportation Company of Baltimore. She is 293 feet in length over all, 42 feet moulded beam and 33 feet 2 inches moulded depth to the weather deck. Her gross register is 2,541 tons. She has four decks and is remarkable for her breadth and depth, but her proportions are those which her owners have found most suitable for their business in their long and successful experience. She is of steel throughout, the scantlings conforming to the rules of the Standard association. The engines are of the triple expansion type, 28, 45, and 72 inches diameters of cylinders, by 48 inches stroke, turning a 16-foot propeller. There are four boilers 13 feet 9 inches diameter and

ruling of the United States supreme court declaring the lakes to be high seas, says:

"This decision will, in my opinion, only help a few men whose interest it is to take advantage of legal persiflage, I have always believed that the respective states had no jurisdiction in those waters. But there is not now a state bounded by the chain of lakes that will not readily lend the police authority for the use of private shipping interests. The new decision, if it stands good, places the lake seamen thus: The state may try a seaman for an alleged offense on board ship, and, failing to convict, the United States will take a hand. If the lakes are high seas they should be represented in congress by a member or members appointed by the president. At the last convention of the State Federation of Labor a measure was introduced asking for such appointments and was carried unanimously. The same measure will most likely be brought before the American Fed-



PASSENGER AND FREIGHT STEAMER GLOUCESTER—BUILT BY MARYLAND STEEL CO., BALTIMORE, MD.

11 feet 7 inches long inside, with 292 square feet of grate in twelve 45-inch furnaces; steam pressure 165 pounds. State-room accommodations for 150 passengers are on the third and fourth decks. There is also on the third deck a saloon 72 feet long and 24 feet wide, together with pantries, galley and crew's quarters. The cabinet work in staterooms and saloon is of a high class, and the accommodations are modern in all respects. The boat has two electric plants, duplicates, both of which are entirely suited to full lighting of the ship, and also a system of electric call bells, etc. The electric fixtures were supplied by Page Brothers & Co. of Boston.

On her trial trip, which occurred a short time ago, the Gloucester's engines developed 2,200 horse power at seventy-three revolutions. The speed was about 15 knots.

## How Elderkin Views It.

Secretary Elderkin of the Seaman's Union, in writing from the lakes to the officers of the national organization about the

eration of Labor at its coming convention. During the past season we have had a continual fight against the vessel owners. By the assistance of unjust laws and hired assassins they have succeeded in a measure of their desired end, i. e., the driving of good seamen to look elsewhere for employment."

## Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store at the principal points of accumulation on the lakes on Dec. 9, 1893:

	Wheat, bu.	Corn, bu.
Chicago .....	19,223,000	1,399,000
Duluth.....	8,412,000	.....
Milwaukee.....	834,000	.....
Detroit.....	1,574,000	11,000
Toledo.....	2,487,000	348,000
Buffalo.....	3,589,000	997,000
Total.....	36,119,000	2,755,000

At the points named there is a net increase for the week of 1,301,000 bushels of wheat and a net decrease of 237,000 bushels of corn.



### A Winter of Idleness in Ore.

There is absolutely nothing in the iron mining business to cause vessel owners to look for anything in the way of freight contracts during the winter, and leading brokers and owners in Cleveland have about made up their minds that, after a winter of idleness, another season will open with no contracts and with all vessels dependent upon the condition of stocks of ore in the spring, and whatever improvement time may bring forth in the general iron market. Gen. Alger of Michigan, who has been interceding for the impoverished miners of his state among capitalists of New York and Cleveland in control of mines, has caused some talk of a resumption of operations through the considerations which his arguments have received from the mining companies, but there can be no general renewal of operations, as the question is purely a business one. With as much ore on Lake Erie docks as there was a year ago and no increase in the movement to furnaces, there is even less in the situation now to warrant active mining than there was a few months ago. As regards the probability of the Missabe product shutting out more of the older mines than are already placed beyond the limit of competition, on account of heavy mining costs, there is but one question to be settled—that of the maximum proportion of this ore to be used in furnace operations. If it is found during the winter that the Missabe ore can be used in the proportion that the standard Bessemer's are now used, the very largest of the older mines will have to be worked on very small margins, as against the steam shovel operations on the new range.

### Wreck of the Steamer F. W. Wheeler.

The supplement accompanying this issue, an illustration of the wreck of the wooden steamer F. W. Wheeler, was prepared from a sketch of the boat made at Michigan City, Ind., by Howard F. Sprague, marine artist, who went to the scene of the wreck for the REVIEW, and secured a picture of the boat just previous to her abandonment by the underwriters. The Wheeler went on the beach near Michigan City, Sunday morning, Dec. 3, after an ineffectual attempt to make Chicago harbor in a snow storm. She was a vessel of 2,100 gross tons capacity, was owned by D. Whitney, Jr. of Detroit and valued at \$95,000.

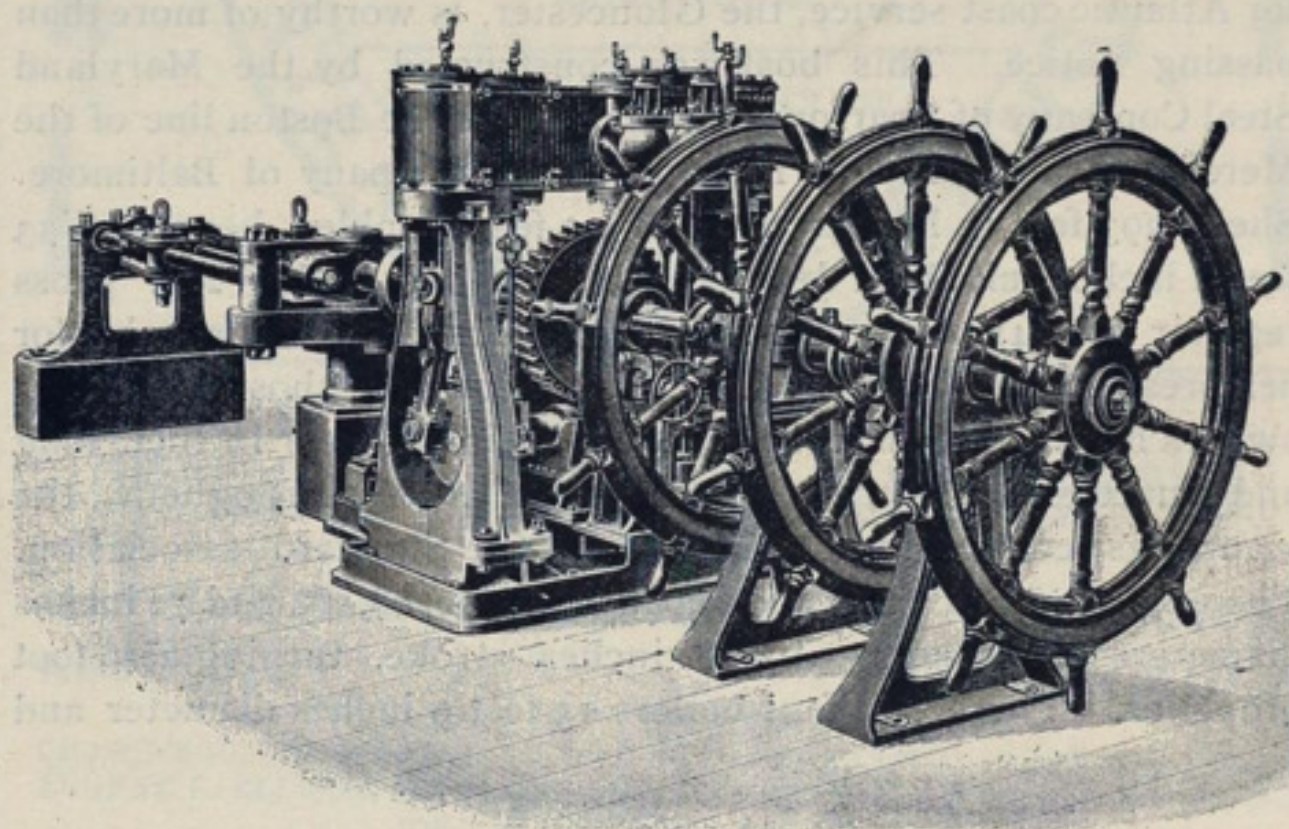
### Northern Line Passenger Ships.

Jan. 3 is the date now fixed for the launch of the North America, the first of the Northern Steamship Company's big passenger ships, building at the yard of the Globe Iron Works Company, Cleveland. The engines are rapidly being taken down in the machinery department and transferred to the ship yard, where the first boat is probably further advanced as regards cabin work and superstructure that usually follow launching, than any passenger ship ever launched. Mr. F. P. Gordon says that the crew for this ship as finally planned will number 140. The second and third officers as well as the chief will hold first class licenses, and in all cases the men holding positions of importance will be hired for the season, or under conditions that will offer inducements for steady service. Another measure of safety will be the employment of a corps of thirteen experienced seamen for the different positions on deck, who will work under the direction of a deck captain. Among the engine room employees inducements will also be given for steady service throughout the season. A summary of cabin arrangements shows that with all available berth space taken up 521 passengers can be accommodated, in addition to about half as many immigrants. The immigrant apartments will be such that they can be utilized for second class passengers on return trips from the head of the lakes.

FIFTEEN PHOTOTYPES OF THE LATEST LAKE STEAMERS AND A PICTURE OF THE GREAT EASTERN, NEATLY BOUND, FOR 50 CENTS. WRITE THE MARINE REVIEW, NO. 516 PERRY-PAYNE BUILDING, CLEVELAND, O.

### Improved Steam Steering Gear.

The illustration represents a steam steering gear that has attracted considerable attention in Great Britain. Messrs. Napier Brothers, Limited, of the Windlass Engine Works, Glasgow, are the manufacturers. The gear is arranged to work direct with a double-threaded screw, or, if expediency demands, it may be worked with chain and barrel, operated by quadrant. The change is easily and quickly made, and either of the arrangements can be worked by steam or hand. By a simple arrangement of clutches, the mechanism is shifted from screw to chain barrel gear, or disconnected from steam to work by hand.



The cylinders are 10 inches in diameter, and the stroke is 10 inches, the steam pressure being 160 pounds to the square inch. On trial on board the Nile, one of the Royal Mail Steam Packet Company's South American steamers, the gear worked from hard over to hard over in twenty-eight seconds. Everything is made to stand heavy strains, all working parts being of steel, the wheels being machine cut. The operating of the valves of the steering engine from the bridge may, of course, be done in many ways; in the Nile and the Danube, sister ships, Brown's telometer system is introduced. The engraving is reproduced from Engineering of London.

### Around the Lakes.

Dec. 20 at 11 a. m. the steamer City of Fremont will be sold by United States Marshal Wiswell of Milwaukee.

The fire which occurred a few days ago in the building in which Kendall's marine reporting office is located at Port Huron, will not in any way interfere with Mr. Kendall's business.

As the shipments of anthracite coal from Buffalo during the entire season, 2,703,673 net tons, are 148,457 tons less than in 1892, it is more than probable that the shipments of soft coal to the head of Lake Superior are a trifle greater than they were in 1892, the Sault canal record showing a gain in the combined shipments, hard and soft, of about 4 per cent.

In seeking an appropriation for Conneaut harbor, Lake Erie, Col. Dick of the Pittsburg Chenango & Lake Erie Railway Company, controlling terminal property at Conneaut, said before the river and harbor committee in Washington a few days ago that a line of coal barges to carry loaded cars will soon be built and put in operation between Conneaut and Port Dover, Ont.

The attention of Supervising Inspector Westcott of Detroit was directed some time ago to the practice of double-ended ferry boats on the Detroit river carrying two sets of signal lights which were often exposed at the same time. Upon investigation Mr. Westcott found that the lights referred to were carried by Canadian boats only. The practice, he says, has now been discontinued.

Although the new dry dock of the Detroit Dry Dock Company is among the largest on the lakes, and was expected, when built two years ago, to accommodate the largest steamers on the lakes for many years to come, the stem of the Centurion, which is now in the basin, is within 16 inches of the head of the dock, and the rudder, which is turned squarely across is not 3 inches from the gate.

CALIFORNIA AND THE PACIFIC COAST—Reached cheaply via the popular Nickel Plate road. Special reduced rates account mid-winter fair.



## St. Mary's Falls Canal Traffic, Season of 1893.

A complete statement of St. Mary's Falls canal traffic for the season of 1893, just closed, prepared under the direction of Gen. O. M. Poe, shows a falling off of  $4\frac{1}{2}$  per cent. in the freight tonnage as compared with last year. It will thus be seen that the general volume of traffic to and from Lake Superior was much larger than was expected early in the season. Coal shipments, hard and soft, were 3.5 per cent. greater than last year, while flour shows an increase of 36.9 per cent., and wheat 6.1 per cent., but the great falling off was in iron ore, the decrease amounting to 886,576 tons, or 18.1 per cent. The following tables give detail regarding the season's traffic.

COMMERCE THROUGH ST. MARY'S FALLS CANAL—SEASONS OF 1892 AND 1893.

ITEMS.	Designation.	SEASONS.		INCREASE.		DECREASE.	
		1892.	1893.	Amount.	Per cent.	Amount.	Per cent.
Vessels (a).....	Number..	12,580	12,008			572	4.5
Lockages.....	Number..	5,867	5,553			314	5.3
Tonnage registered.....	Net tons.	10,647,203	9,849,754			797,449	7.5
Tonnage freight.....	Net tons.	11,214,333	10,796,572			417,761	3.7
Passengers.....	Number..	25,896	18,869			7,027	27.1
Coal.....	Net tons.	2,904,266	3,008,120	103,854	3.5		
Flour.....	Barrels..	5,418,135	7,420,674	2,002,539	36.9		
Wheat.....	Bushels..	40,994,780	43,481,652	2,486,872	6.1		
Grain other than wheat.....	Bushels..	1,666,690	2,405,344	738,654	44.3		
Manufact'd and pig iron.....	Net tons.	101,520	89,452			12,068	11.9
Salt.....	Barrels..	275,740	228,730			47,010	17.0
Copper.....	Net tons.	64,993	87,530	22,537	34.6		
Iron ore.....	Net tons.	4,901,132	4,014,556			886,576	18.1
Lumber.....	M. ft. b. m.	512,844	588,545	75,701	14.8		
Silver ore.....	Net tons.	1,930	2,470	540	28.0		
Building stone.....	Net tons.	39,698	19,426			20,272	51.0
Unclassified (b).....	Net tons.	459,146	415,180			43,966	9.6

## NOTE (a).

Steamers.....	8,379
Sails.....	2,955
Unregistered.....	674

Total.....12,008

The canal was open to navigation 233 days during the season of 1892, and 219 days during 1893.

ESTIMATED VALUE OF FREIGHT THROUGH THE CANAL, 1893.

ITEMS:	Designation.	Quantity.	Price per unit.	Valuation.
Coal, hard and soft.....	Net tons.	3,008,120	2 50	\$10,528,420 00
Flour.....	Barrels.	7,420,674	4 00	29,682,696 00
Wheat.....	Bushels.	43,481,652	75	32,611,239 00
Grain, (other than wheat).....	Bushels.	2,405,344	56	1,346,992 64
Manufactured iron.....	Net tons.	57,046	50 00	2,852,300 00
Pig iron.....	Net tons.	32,406	17 00	550,902 00
Salt.....	Barrels.	228,730	1 00	228,730 00
Copper.....	Net tons.	87,530	200 00	17,506,000 00
Iron ore.....	Net tons.	4,014,556	3 50	14,050,946 00
Lumber.....	M ft., b. m.	588,545	18 00	10,593,810 00
Silver ore and bullion.....	Net tons.	2,470	153 79	379,861 30
Building stone.....	Net tons.	19,426	10 00	194,260 00
Unclassified, freight.....	Net tons.	415,180	60 00	24,910,800 00
				\$145,436,956 94

NOTE.—The price per unit is based on the values used in 1885, with the exceptions of the items of flour, wheat and grain other than wheat, for which a new valuation was adopted in 1892. The average per ton of freight is \$13.47.

## Performance of Steamer City of Alpena.\*

The City of Alpena and City of Mackinac, duplicate side-wheel steamers built last winter for the Lake Huron division of the Detroit and Cleveland Steam Navigation Company by the Detroit Dry Dock Company from designs of Mr. F. E. Kirby, are 275 feet in length on deck, 15 feet moulded depth and 68 feet in breadth, moulded, over guards. The hulls are of steel, made to the following specification: "All steel to be of open-hearth manufacture; tensile strength, 52,000 to 60,000 pounds; elastic limit, at least one-half ultimate; elongation, 25 per cent. in 8 inches; reduction, at least 45 per cent.; fracture, silky; phosphorus not to exceed .08 per cent. From a plate of each ingot of steel used a crop end shall be tested by punching a three-fourth-inch hole—the center of the hole being  $1\frac{1}{8}$  inches from the sheared edge—without fracture. Material to be tested for tensile and bending tests by melts from strips cut from material as rolled for orders. All material to be stamped by melt number for identification in inspecting. Actual weight of each piece of material to be within  $2\frac{1}{2}$  per cent. of theoretical weight. No lighter weight will be accepted, but overweight may be accepted

if billed at theoretical weight. All steel to be subject to the approval or rejection of the superintending engineer, and memoranda of each shipment to be furnished to inspectors, who shall approve each invoice as being satisfactory and in accordance with the specifications before shipment. Makers to furnish inspectors' analysis of each melt of steel, and to furnish all necessary test specimens and to give all necessary assistance for testing material."

These boats carry both freight and passengers between Toledo, O., Mackinac island and intermediate points. Each boat makes two round trips, or about 1,700 miles per week. On the trip on which these notes were taken there were no departures from the ordinary working. The average steam pressure was nearly 95 pounds. The following are some of the hull data:

Length, L. W. L., feet.....	266
Breadth moulded, feet and inches.....	38-6
Immersed midship area, moulded, at 9 feet $2\frac{3}{4}$ inches moulded draught, square feet.....	327.4
Cylindrical co-efficient = $\frac{1.712 \times 32}{266 \times 327.4}$ .....	0.629
Block co-efficient = $\frac{1.712 \times 32}{266 \times 3.85 \times 9.28}$ .....	0.576

The engines were built by the W. & A. Fletcher Co. of New York and are compound, beam, condensing, with feathering wheels.

H. P. cylinder, diameter and stroke, inches.....	42 × 88
L. P. cylinder, diameter and stroke, inches.....	66 × 132
Wheels, diameter, outside buckets, feet and inches.....	25-7
Wheels, diameter, centers of suspension, feet and inches.....	22-6
Number of buckets, each wheel.....	10
Face of buckets × breadth, feet and inches.....	10 × 3-6
Number of buckets immersed on this run, both wheels.....	4
Height of center of shaft above water, feet and inches.....	8-8½
Immersion of lower edge of buckets, feet and inches.....	4-1
Radius of rolling circle, for mean of run, feet and inches.....	8-10¾
Immersion of rolling circle, feet and inches.....	0-2½

Boilers, double-ended, Howden system of forced draft.

Number.....	2
Mean diameter, feet.....	12
Length over heads, feet and inches.....	19-7½
Working pressure, pounds per square inch.....	120
Total grate surface, square feet.....	160
Total heating surface, square feet.....	6,566
Blower.....	1
Diameter, inches.....	66
Area of air main, square inches.....	1,296
Engine, double, horizontal, direct, inches.....	6 × 6

PERFORMANCE, STEAMER CITY OF ALPENA, AUGUST 12 AND 13, 1893.

From—	To—	Miles—5,280 feet.	Time.	Miles per hour.	Revolutions per minute.	Slip, per cent., on diameter, 22½ feet.	Mean draught.	Displacement (net tons).
Mackinac Island.....	Cheboygan.....	16	h. m. s.	16.045	26.11	23.48	9-2	1,685
Cheboygan.....	Alpena.....	99	5.47.10	17.11	26.77	20.45	9-2.4	1,693
Alpena.....	Oscoda.....	52	2.57.45	17.55	26.85	18.64	9-3.9	1,720
Oscoda.....	Sand Beach.....	55½	3.21.00	16.567	26.55	22.33	9-4.3	1,729
Sand Beach.....	Lexington.....	43	2.30.25	17.152	26.82	20.39	9-4.4	1,730
Lexington.....	Fort Gratiot light.....	20	1.12.00	16.130	27.39	24.25	9-4.2	1,726
Mackinac Island.....	Fort Gratiot light.....	285½	16.48.10	16.991	26.76	20.947	9-3.4	1,712

The I. H. P. at 8 feet 11 inches mean draught and 28.5 revolutions was 2,398. For this run it is assumed to be—

$$\frac{2,398 \times (26.76)^3}{(28.5)^3} = 1,985.$$

$$C = \frac{S^3 \times D^{\frac{3}{2}}}{I.H.P.} = \frac{(16.991)^3 \times (1.712)^{\frac{3}{2}}}{1,985} = 353.6.$$

$$C \text{ for gross tons and knots} = 214.7.$$

$$\text{Indicated thrust, pounds,} = \frac{1,985 \times 33,000}{26.70 \times 70,686} = 34,630.$$

$$\text{Indicated thrust, pounds, per square foot of immersed bucket} = \frac{34,630}{4 \times 10 \times 3.5} = 247.35.$$

\*E. L. McAllister in Journal of the American Society of Naval Engineers.



## Record of Marine Patents.

A SYNOPSIS OF SPECIFICATIONS ACCOMPANYING PATENTS OF A MARINE NATURE—FROM LATEST PATENT OFFICE REPORTS.

**509,463. MARINE VESSEL.** John B. Davids, North Dartmouth, Mass., assignor, to E. M. Chisholm Davids, same place. Filed Oct. 3, 1892. Serial No. 447,742. (No model.)

Claim: In combination with a marine vessel, a series of independent air reservoirs, composed of non-corrosive material, and adapted to fit in the spaces between the inside and outside planking of said vessels, between the deck beams and other practically waste places, which would become filled with water, when the vessel was partially or wholly submerged, as and for the purposes described.

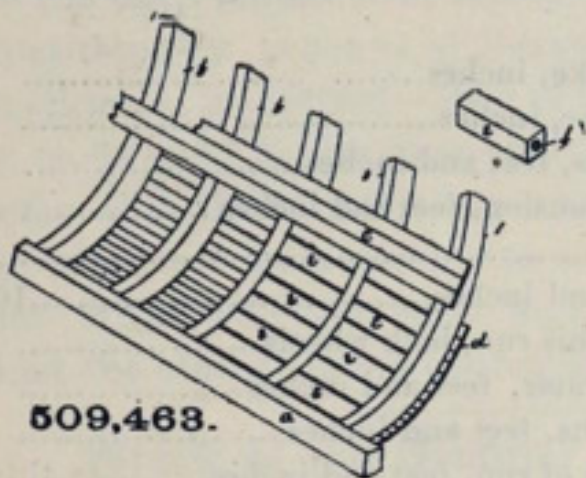
**509,511. STEERING-ENGINE.** William Craig, Brooklyn, N.Y. Filed Dec. 21, 1892. Serial No. 455,865. (No model.)

Claim: The combination in a steam steering apparatus, of a cylinder and piston, a valve and a hand gear therefor to control induction and eduction ports communicating with opposite ends of said cylinder, a steam boiler, a pipe forming communication between the water space of the said boiler and said valve, and connections between the piston and the rudder at opposite ends of said cylinder, all substantially as herein set forth.

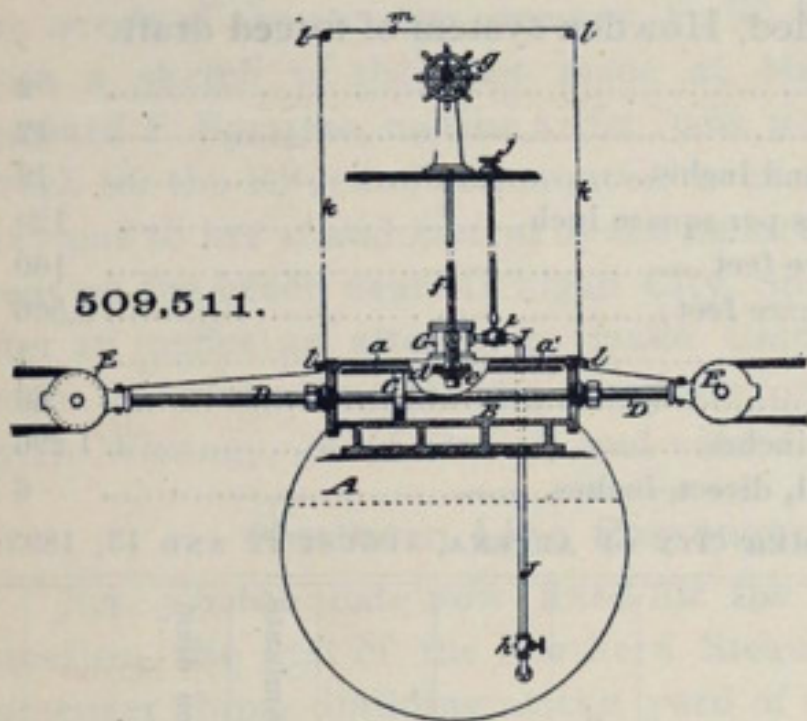
**509,752. TRIPLE-EXPANSION ENGINE.** James Marshall, Leeds, England. Filed August 31, 1892. Serial No. 444,680. (No Model.) Patented in England Sept. 2, 1891. No. 14,857.

Claim: In triple expansion engines the combination of a cylindrical main

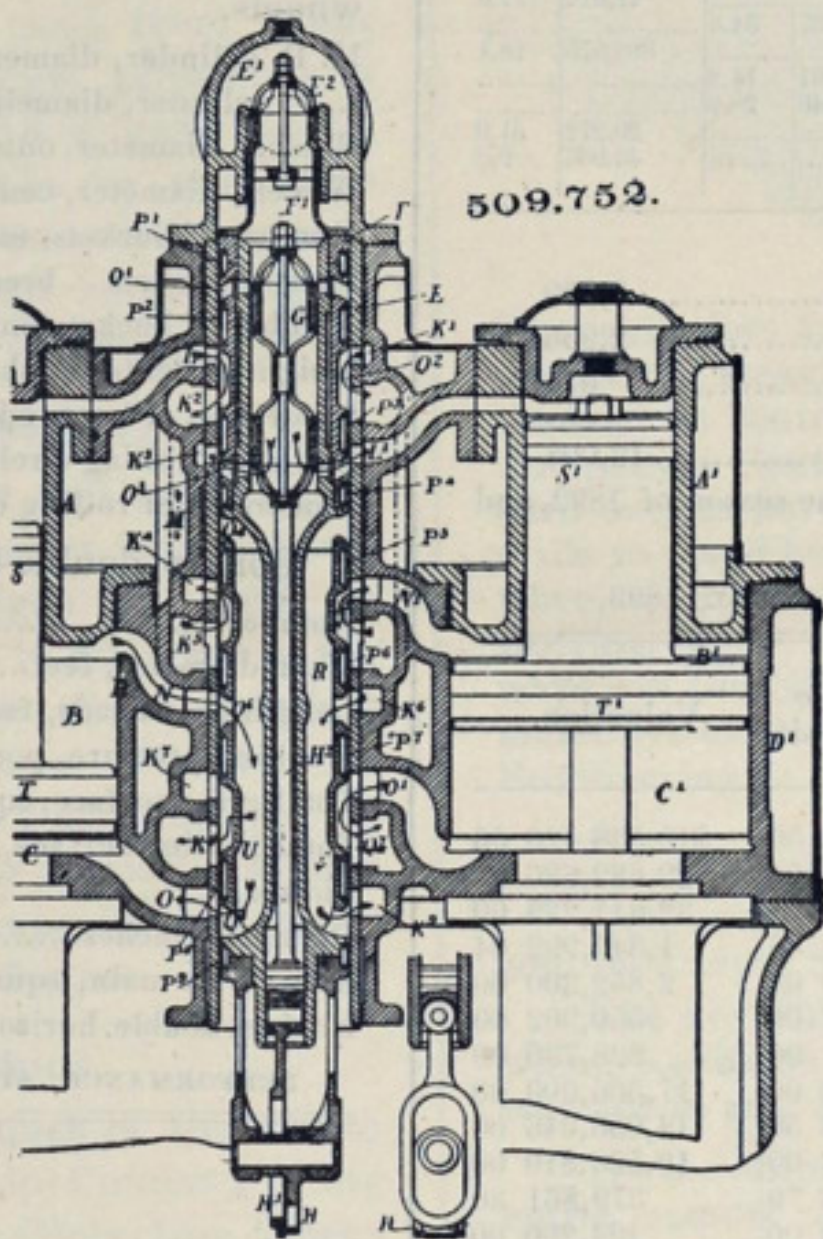
angles to form bilges which are adapted to serve as side keels, substantially as shown and described. Third, the combination with the hull of a vessel, the sides of which are provided with cavities, of a series of propeller-carrying shafts arranged coincident with and terminating in the cavities, front and rear shafts arranged in the bow and stern, respectively, means for operating the same and the transverse shaft, twin propeller wheels mounted upon each of the front and rear shafts, said wheels having their blades spaced apart and arranged in annular series, the blade of one series alternating with those of the other, substantially as specified. Fourth, the combination with a vessel of a series of transverse shafts arranged therein and extending from its sides, and front and rear shafts carrying propeller wheels, of a rear engine for operating the rear shafts, the front engine for operating the front shafts, an electric motor arranged adjacent to each of the transverse shafts, a dynamo connected therewith, and connections between the front engine and the dynamo and from the dynamo to the motors, substantially as specified. Fifth, the vessel having an inner wall, combined with an outer wall compoundly curved and at intervals contacting with the inner wall of the vessel, forming a series of water-tight compartments, and between the same a series of caves, propellers arranged in the caves, and means of operating said propellers, substantially as specified. Sixth, the combination with a vessel having an inner wall and an outer wall compoundly curved and alternately contacting with the inner wall thus forming a series of water-tight compartments, and intermediate arches, of transverse shafts terminating in the arches, propellers carried by the shafts, and means for operating the shafts, and an outer wall for removably covering the arches, substantially as specified.



509,463.



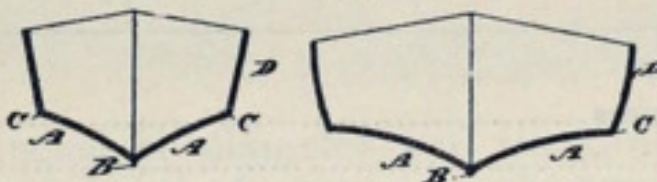
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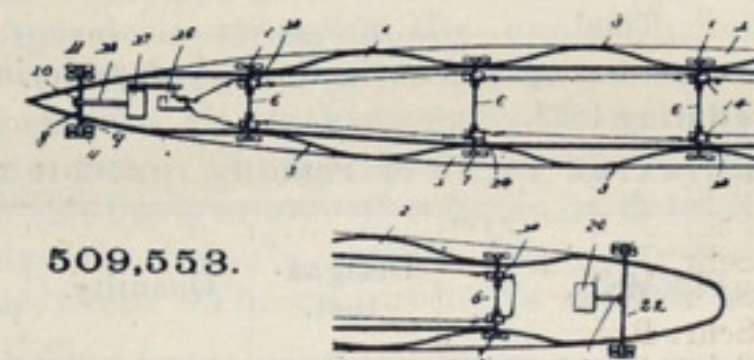
509,752.



509,672.



509,553.



509,808.

slide valve F having ports Q' Q<sup>3</sup> controlled by a central cylindrical expansion valve, and communicating respectively with the port L of the high pressure cylinder A and with the port L' of the high pressure cylinder A', a port Q<sup>2</sup> communicating with the ports L and L' of cylinders A and A' and with the steam chamber M, ports Q<sup>4</sup> Q<sup>6</sup> Q<sup>8</sup> connected by annular passage R, and communicating respectively with ports N' of cylinder B', port N of cylinder B, port O' of cylinder C', and port O of cylinder C, port Q<sup>5</sup> communicating with port N of cylinder B, port N' of cylinder B' and chamber M, and port Q<sup>7</sup> communicating with port O of cylinder C, port O' of cylinder C', and with port K<sup>8</sup> leading to exhaust U, and a cylindrical valve chamber E having ports K' to K<sup>9</sup> inclusive communicating respectively with cylinders A A', B B', C C', steam chamber M, and exhaust U, substantially as described.

**509,672. SHIP'S HULL.** Patrick O'Brien, St. John's, Newfoundland. Filed Oct. 4, 1892. Serial No. 447,810. (Model.)

Claim: First, a boat's hull having a bottom extending upwardly from the keel, said bottom being convex in longitudinal and concave in transverse direction, and essentially straight sides inclined inwardly from the deck toward the bottom, said bottom and sides meeting at sharp angles to form bilges which are adapted to serve as side keels, substantially as shown and described. Second, a boat's hull having a bottom extending upwardly from the keel, said bottom being convex in longitudinal and concave in transverse direction, the concavity increasing toward the stern, and essentially straight sides inclined inwardly from the deck toward the bottom, the portion of the sides near the stern being essentially convex, and the inclination of the sides increasing from one end of the boat to the other, the said bottom and sides meeting at sharp

**509,553. SHIP.** Richard B. Painton, Williamsport, Pa., assignor of one-half to William G. Elliott, same place. Filed May 31, 1893. Serial No. 576,123. (No model.)

Claim: First, the combination with the hull of a vessel provided with arches or cavities formed therein at intervals along its side, and adapted to be covered by a shutter and provided with removable hatches, of a series of transverse shafts arranged coincident with the cavities and terminating in the same, propellers carried by the shafts, and means for operating the shafts, substantially as specified. Second, the combination with a vessel provided at intervals along its side with arches or cavities, of a series of transverse shafts arranged coincident with and terminating in the arches, propellers mounted on the shafts within the arches, and front and rear propeller-carrying shafts arranged at each side of the bow and stern of the vessel, propeller wheels arranged upon the outer ends of the front and rear shafts, the blades of said wheels being twisted, and means for operating the transverse and the front and rear shafts, substantially as specified.

**509,808. STEAMBOAT.** Chrestofer Haugan, West Superior, Wis. Filed Feb. 15, 1893. Serial No. 462,466. (No model.)

Claim: The combination of the keel having a cut away portion and comprising the parts 13 and a propeller shield 13' continuous therewith, posts connecting said shield to the boat bottom, and the screw propeller shaft extending through the posts and having bearings therein and in the parts 13 of the keel said posts being enlarged about the bearings therein and a well intermediate the posts and driving cranks on the shaft within said well, substantially as set forth.



## Lake Vessels that Passed Out of Existence, Season of 1893.

DATE.	NAME OF VESSEL.	CAUSE.	PLACE.	VALUE.	Capacity, Gross tons.	OWNER AND HOME PORT.
April 6	Schr. Lumberman.....	Foundered.....	Off Racine.....	\$3,000	300	Hanson & Mahrek, Kewaunee
" 20	Schr. M. L. Collins.....	Stranded.....	South Manitou Bay.....	3,000	400	Plattner, et al., Milwaukee.
" 20	Schr. Kewaunee.....	Stranded.....	Racine.....	5,000	450	J. H. & F. H. Kelley, Racine.
" 20	Schr. Sea Gem.....	Stranded.....	South Manitou Bay.....	1,500	150	Mason, et al., Charlevoix.
" 20	Schr. Florence Smith.....	Stranded.....	South Manitou Bay.....	1,200	100	Tullich, et al., Charlevoix.
" 20	Schr. R. B. Hayes.....	Foundered.....	Lake Michigan.....	18,000	1,400	J. C. Gilchrist, Cleveland.
" 22	Schr. Newell A. Eddy.....	Foundered.....	Straits.....	70,000	2,200	Eddy Trans. Co., Bay City.
May 1	Tug Sea Gull.....	Fire.....	Straits.....	30,000	.....	James Reed, Bay City.
" 18	Schr. Pelican.....	Foundered.....	Ashtabula.....	12,000	1,500	Lakewood Trans. Co., Cleveland.
" 19	Tug Ida M. Sims.....	Fire.....	Ludington.....	2,000	.....	Carter Lumber Co., Ludington.
June 2	Schr. Corsican.....	Collision.....	Lake Huron.....	2,000	500	S. B. Grummond, Detroit.
" 21	Stmr. S. C. Clark.....	Fire.....	Lake Huron.....	15,000	400	J. W. Squire, Marine City.
" 24	Stmr. Skater.....	Fire.....	Manistee.....	7,500	70	Seymour Bros., Manistee.
July 20	Schr. Vance.....	Collision.....	Lake Erie.....	25,000	1,550	James McKenzie, Buffalo.
" 20	Tug C. C. McDonald.....	Fire.....	Saginaw river.....	1,000	.....	G. C. Sherbert, Bay City.
Aug. 5	Tug L. Wallace.....	Fire.....	Onkama.....	4,000	.....	J. D. Padder, Manistee.
" 5	Stmr. Josephine Tolley.....	Fire.....	Sandusky.....	1,500	150	J. Homegardner, Sandusky.
" 7	Stmr. Mary Pringle.....	Fire.....	Port Huron.....	9,000	350	Thos. Curry, Port Huron.
" 13	Schr. H. J. Mills.....	Foundered.....	Lake Ontario.....	15,000	850	Geo. Hall Co., Ogdensburg.
" 13	Schr. Wm. Wheeler.....	Foundered.....	Lake Ontario.....	5,000	550	Geo. Hall Co., Ogdensburg.
" 13	Schr. Laura.....	Foundered.....	Lake Ontario.....	3,000	500	J. & T. Mathews, Toronto.
" 20	Stmr. Oneida.....	Fire.....	Lake Erie.....	32,000	800	James Davidson, Bay City.
" 30	Tug O. Wilcox.....	Foundered.....	Lake Huron.....	6,000	.....	J. & T. Hurley, Detroit.
Sept. 5	Stmr. Arctic.....	Foundered.....	Lake Huron.....	22,500	400	Underwood & Coman, Menominee.
" 12	Stmr. Byron Trerice.....	Fire.....	Leamington.....	16,000	100	W. D. McRae, Wallaceburg.
" 15	Schr. Adirondack.....	Stranded.....	So. Manitou.....	3,000	400	A. J. Brown, Sturgeon Bay.
" 18	Schr. Bahama.....	Stranded.....	Pt. Elgin.....	4,500	500	Mills Trans. Co., Port Huron.
" 18	Schr. Yankee.....	Stranded.....	Pt. Elgin.....	4,500	500	Mills Trans. Co., Port Huron.
" 18	Schr. Sam'l Bolton.....	Stranded.....	Lake Huron.....	3,500	600	Candler Bros., Detroit.
" 22	Schr. Michigan.....	Foundered.....	Point Sable.....	25,000	2,200	J. C. Gilchrist, Cleveland.
" 28	Tug Mystic.....	Fire.....	Lake Superior.....	10,000	.....	B. B. Moiles, Saginaw.
" 30	Schr. Windsor.....	Stranded.....	Cana Island.....	5,000	400	David Williams, Chicago.
" 30	Schr. M. A. Muir.....	Stranded.....	Ahnapee.....	6,000	630	David Muir, Chicago.
" 30	Schr. Sassacus.....	Stranded.....	Jacksonport.....	1,000	300	G. W. Wing, Kewaunee.
Oct. 6	Schr. David Stewart.....	Foundered.....	Pigeon bay.....	12,000	1,100	J. W. Squire, Marine City.
" 6	Stmr. Ida Torrent.....	Fire.....	Cross Village.....	21,000	400	Wm. Hurlow, Toledo.
" 8	Schr. Evra Fuller.....	Stranded.....	Racine.....	5,000	450	Joseph Smith, Chicago.
" 13	Tug Acme.....	Foundered.....	Black River.....	22,000	.....	Mich. Log Towing Co., Bay City.
" 14	Schr. Volunteer.....	Stranded.....	Port Austin.....	800	100	Westfall, et al., Detroit.
" 14	Stmr. Wocoken.....	Stranded.....	Lake Erie.....	64,000	2,000	Mitchell & Co., Cleveland.
" 14	Stmr. Dean Richmond.....	Foundered.....	Lake Erie.....	45,000	1,500	J. Bots'ord, Port Huron.
" 14	Schr. Minnehaha.....	Stranded.....	Onkama.....	25,000	1,600	H. J. Johnson, Cleveland.
" 14	Schr. C. B. Benson.....	Foundered.....	Port Colborne.....	6,500	600	E. H. Norton, Toledo.
" 15	Schr. J. D. Sawyer.....	Stranded.....	Charlevoix.....	16,000	1,200	J. McMorran, Port Huron.
" 15	Schr. J. B. Merrill.....	Stranded.....	Drummond's Island.....	20,000	1,300	Cornell Bros., Buffalo.
" 15	Schr. George.....	Stranded.....	Lake Superior.....	25,000	1,300	M. Fox, Marblehead.
" 15	Schr. Riverside.....	Foundered.....	Lake Erie.....	5,000	600	J. M. Jones, Detroit.
" 15	Schr. Annie Sherwood.....	Foundered.....	Lake Superior.....	12,000	1,000	Bigelow Bros., Chicago.
Nov. 3	Schr. M. R. Warner.....	Stranded.....	Sand Island.....	18,000	1,500	M. A. Bradley, Cleveland.
" 7	Stmr. Philadelphia.....	Collision.....	Lake Huron.....	80,000	1,400	Anchor Line, Erie.
" 7	Stmr. Albany.....	Collision.....	Lake Huron.....	160,000	1,900	Western Trans. Co., Buffalo.
" 10	Stmr. Thos. H. Smith.....	Collision.....	Off Racine.....	18,000	300	Leatham & Smith, Sturgeon Bay.
" 11	Stmr. Lowell.....	Fire.....	St. Clair.....	10,000	400	Denny, et al., Detroit.
" 16	Schr. Travis.....	Stranded.....	Cana. Island.....	1,500	150	Albert Reke, Milwaukee.
" 16	Tug E. J. Redford.....	Stranded.....	Oswego.....	7,000	.....	.....
" 16	Tug M. J. Cummings.....	Fire.....	Cape Vincent.....	7,000	.....	T. Dunovan, Oswego.
" 18	Tug Geo. Douglas.....	Fire.....	Owen Sound.....	3,500	.....	James Cana, Owen Sound.
" 23	Schr. Wonder.....	Stranded.....	Grand Haven.....	500	75	J. Waltham, Chicago.
" 25	Tug Beebe.....	Fire.....	Put-in-Bay.....	700	.....	Sand Beach Fish Co., Port Huron.
" 26	Schr. E. P. Royce.....	Stranded.....	Cana Island.....	4,000	400	M. McNulty, Chicago.
Dec. 3	Stmr. F. W. Wheeler.....	Stranded.....	Michigan City.....	95,000	2,100	D. Whitney, Jr., Detroit.
" 3	Schr. Drednaught.....	Stranded.....	Sturgeon bay.....	1,000	100	Capt. Oleson, Cheboygan.
" 4	Tug R. W. Crowell.....	Foundered.....	Michigan City.....	16,000	.....	J. S. Dunham, Chicago.
" 5	Stmr. W. A. Avery.....	Fire.....	Straits.....	80,000	1,800	Hawgood & Avery, Cleveland.
" 6	Stmr. Mascotte.....	Fire.....	Detroit river.....	18,000	200	Stevenson & Marsh, Detroit.
SUMMARY—		Capacity, gross tons, 41,625.	Foundered, 17.	Fire 18.		
Number of boats, 65.		Valuation, \$1,172,200.	Stranded, 25.	Collision, 5.		

## Vessels Lost During 1893.

With a view to showing simply the number of vessels that have passed out of existence during the past season of navigation, the table on this page is prepared. It includes sixty-five vessels, valued at \$1,172,000 and of 41,625 tons capacity. As compared with previous seasons, the losses were as follows:

Year.	Number of vessels.	Capacity gross tons.	Value.
1893.....	65	41,625	\$1,172,200
1892.....	57	28,708	1,014,250
1891.....	52	27,496	564,800
1890.....	34	16,306	757,000

No account is taken here of any loss excepting where the vessel actually ceases to be a competitor in the carrying trade, and the information is valuable mainly in comparing the lost tonnage with the tonnage under contract at lake ship yards. From statistics already prepared, and which will be published later, it is learned that at the different ship yards there is now under contract, notwithstanding the depressed condition of lake shipping, fourteen freight boats of about 24,500 gross tons

capacity. Thus the comparison between vessels lost during 1893 and new freight vessels now under contract is as follows:

	Gross tons.
Capacity of vessels lost, 1893.....	41,625
Capacity of new vessels under contract Dec. 15, 1893.....	24,500
Deficiency.....	17,125

There is no way in which accurate figures can be secured covering losses to hulls and cargoes from strandings and numerous other causes. The underwriters are unwilling to make a general statement, and then, too, many accidents occur to vessels on which there is no insurance.

The American Shipmasters' Association of New York, publishers of the Record of American and Foreign Shipping classed last week the bark Edmund Phinney, barkentine George C. Perkins, three-masted schooners Florence Randall and Three Sisters and schooners Wm. J. Lipsett, all American; also the British schooner Alice.



# MARINE REVIEW.

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

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## ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.

	St. Mary's Falls Canal.			Suez Canal.		
	1892.	1891.	1890.	1892.	1891.	1890.
No. vessel passages	12,580	10,191	10,557	3,559	4,207	3,389
Ton'ge, net regist'd	10,647,203	8,400,685	8,454,435	7,712,028	8,698,777	6,890,014
Days of navigation..	223	225	228	365	365	365

Entered at Cleveland Post Office as Second-class Mail Matter.

FERDINAND SBHLESINGER says that the iron interests of Lake Superior have not so much to fear from the importation of Cuban ore as they have from the development of Canadian deposits along the north shore of Lake Superior, which would be sure to follow the removal of duty. In this Mr. Schlesinger is entirely correct. There is certainly immense quantities of good ore in the Canadian territory above Duluth, which has not been mined on account of the duty, and strangely enough this feature of ore tariff question has been overlooked, while the argument against imported Cuban ore is open to the criticism that the long rail haul from the seaboard would prevent competition with Lake Superior ores west of the Alleghenies. But of course the free trader who says that the Cuban ores can be used only on the Atlantic seaboard takes no account of the indirect competition in manufactured iron that the furnaces and mills of western Pennsylvania, Ohio and other middle states would be compelled to meet on account of free Cuban ore.

SUPERINTENDENT KIMBALL of the life saving service again brings up the question of applying to the lakes the law which now compels sea going steamers to carry guns for throwing life lines. He again makes the claim that all vessels should carry these guns. He might just as well hold that the ordinary freight boat should be equipped with all the life saving appliances of an Atlantic liner, for it is certain that just as soon as the vessel owners would allow the guns to be forced upon their vessels by law they would be followed by hundreds of other patent appliances seeking sale through the same channel. It was on this ground, mainly, that the line carrying projectile law was successfully fought by lake interests. There is, however, entirely too much paternalism in government matters pertaining to merchant marine, as Superintendent Kimball and others may learn when the shipping interests demand a radical reform in the whole system of disconnected departments and bureaus.

ENGLISH journals seem to accept the conclusion of the British admiralty that the war ship Victoria, which was run into and sunk with great loss of life by the Camperdown, while the vessels were maneuvering in the Mediterranean, would have been saved if the water-tight doors, hatches and ports had been closed. With the general structural arrangements of the Victoria so similar in many respects to those of other ships in the British navy, it could hardly be expected that the admiralty would admit that the loss was due to any fault in the principle of construction.

THE Cramps and the International Navigation Company, builders and owners of the new American line ships, have, as might be expected, changed plans for the two first ships, so that according to the latest information regarding them, they are to be 536 feet long and of 20,000 horse power. With the

forced draft that is to be applied to these steamers, it would not be surprising if they prove more formidable rivals of the big Cunarders than it was expected they would be when their keels were laid.

THE carrying capacity of vessels lost on the lakes during the past season is about 17,000 tons less than that of the new vessels now under contract in the ship yards, and thus for the first time in eight years there is a halt in the great increase in tonnage. In previous years the tonnage of new vessels under contract each fall has been so much in excess of the losses of the previous season as to cause little attention to be given to the latter,

IN A paper read at one of the recent engineering congresses Charles H. Cramp expressed the opinion that more than 12,000 indicated horse power can not economically be put through one screw, and that if the horse power exceeds 24,000 there should be three screws. He adds that volumes enough to make a library by all the professors in the world can not alter this plain mechanical fact.

GREAT BRITAIN has awakened to the value of tubulous boilers for high power in ships. The new cruiser Powerful, which the government proposes building by private contract, will be of 14,000 tons displacement, not less than 30,000 horse power and will have forty-eight tubulous boilers with four immense stacks.

THE British lords of the admiralty have placed an order with the French firm M. M. Delannay, Belleville & Co. for a battery of boilers of the Belleville type, for the torpedo destroyer Sharpshooter of 4,000 horse power, now in course of construction.

## Risks on Steel Vessels.

It is certain that the lake underwriters are thoroughly displeased with their business during the past season in risks on steel vessels. They say themselves that their principals are complaining, some of the companies threatening to withdraw entirely from the lake business, they claim, on account of the heavy losses due to stranding in shallow channels. As the general agents carefully guard all figures covering premiums and losses, it is difficult, however, to secure a reliable statement as to the business generally, but some of the losses have been very heavy. Take for example the four big steel steamers, Curry, Merida, Centurion and Gratwick, turned out last spring by F. W. Wheeler & Co. The total of premiums on these boats on valuations of \$250,000 each for the Curry, Merida and Centurion and \$200,000 for the Gratwick, would be \$27,075. Two of these boats, the Merida and Centurion, met with accidents through stranding and the other two passed the season practically free of expense to the underwriters, the Curry requiring no repairs and the Gratwick receiving only a new wheel. But repairs on the Merida as a result of two strandings foot up about \$32,000, and on the Centurion \$16,000, which with \$2,100 for a new wheel on the Gratwick make a total of \$50,100, as against premiums on all, previously noted, of \$27,075. Now these boats are, of course, among the best of steel risks, as their construction is of the highest class, but the losses are due to meeting with rocks in shallow channels. The selection of these four boats from among the many steel steamers on the lakes may not be considered fair to the steel boat interests, and the premiums paid on this class of tonnage may still be ample in all respects, but it is certain that the high grade wooden boats have again paid in premiums during the past season more than their share of the losses. The competition of foreign underwriters, who have sought steel risks and who give no attention to the wooden boats, is of course the main cause of difference. The underwriters will without doubt find more trouble in trying to fix up differences in insurance matters before another season comes around.



### Tips From the Man on the Dock.

The discussion of whalebacks having taken the form in your last issue of a savage attack on their originator, I think it had better be dropped. "Fairplay" might as well have signed his own full name, his identity being but poorly concealed by the one he uses. If McDougall is so deeply indebted to "Fairplay" for the brains needed to develop the pig, it would seem pertinent to ask why did not "Fairplay" himself propose the idea. It is the old story of thunder-stealing. However I do not propose to be drawn into an exchange of personalities. I was discussing the vessel, not the builder, and if "Fairplay" has nothing to say about the subject proper we will drop the matter right here. Turn the crank, Dennis!

The people of Detroit are having a heap of fun over an alleged fire boat which they recently purchased. The ridicule that has been heaped upon her would have sunk an Atlantic liner. They had quite a big fire there the other day, not far from the river front and within the scope of the boat's operation, and a Detroit paper says in commending her that "she arrived on the scene in less than an hour." I am informed that the distance from her berth to the scene of the fire is eight whole blocks. What do the Detroit people want anyhow? The boat combines in herself a good many innovations, as witness the following, which is taken from an article in the Detroit Evening Journal, (Nov. 21) a copy of which has been forwarded to me: "The propelling power of the boat consists of a double non-condensing engine with two cylinders, (Just think of it! A double engine to have two whole cylinders all to itself) which with the double acting pumps is capable of throwing five thousand gallons of water per minute." I don't quite understand what the throwing of that quantity of water has to do with the propelling power or what the aforesaid double non-condensing engine has to do with the throwing of the water, but no doubt these are things which the paper says go to make her a "wonderful piece of mechanism."

I am moreover assured by trustworthy persons that this boat can easily make eight miles an hour down stream. Her detractors say she will be useless when old Detroit river gets jammed up with its usual winter coating of ice, but the article in the paper mentioned says that "the engineer of the 'Detrioter' positively asserts that he can bore a hole through a 16-inch wall by bringing to bear the full power of the boat's pumps upon it." I should think these pumps could be used in like manner against the ice floes. All you have to do is to show them the wall and they forthwith start to bore. But what is the matter with just starting the propelling mechanism to work pumping five thousand gallons of water a minute on top of the ice and the boat could then easily scoot right along, and when she came to a chunk too high to get over just have the pumps ready to bore a hole through it. Of course I may be away off in this matter but I don't pretend to know anything about it; I merely throw out the suggestion. I notice also that she has an "electric light plant run by a separate engine." This I am sure is a radical departure from the usual method of lighting boats. And she has "a fan engine for cooling the firehole, which in hot weather is like a furnace, as 100 pounds of steam is constantly kept." This is evidently a misprint and should read "a fan engine for heating the firehole," &c, as the firehole is like a furnace.

I was in Detroit one day last summer and while sitting in a friend's office overlooking the river I heard a sound as of about 4,000 locomotives barking and roaring. Looking into the street I saw the crowd rushing madly towards the river and turning in that direction I beheld a magnificent sight. The new fireboat resplendent in glossy paint and polished brass was tearing madly up the river at fully seven miles an hour. As she whizzed by, I managed with a great effort to make my friend hear my question as to where she was going. "Oh, she is out on a secret trial," he answered, and I now firmly believe you can hunt ducks with a brass band. Of course all the noise was to let the people know that the trial was secret. The boat must be of some use or else she would not spend so much time at the repair shop. If she wasn't just what was wanted I am sure the people wouldn't spend so much money to keep her in repair. Having a boat with so many modern improvements necessitates constant care in looking after them, and I am told that all the shops in Detroit devote a share of their time to keeping this boat in the best of condition. I hope to hear no more ill-natured strictures on Detroit's fireboat.

### In General.

The hydrographic office, navy department, will furnish to applicants instructions for backing charts.

In seven and one-half hours the steamer Selwyn Eddy was a few days ago unloaded of 2,500 tons of package freight at the Buffalo houses of the Western Transit Company.

In accordance with their bid of \$280,000 each for the three new gunboats, Secretary Herbert a few days ago awarded the contract to the Newport News Ship Building and Dry Dock Company.

Messrs. Doxford & Sons, shipbuilders of Sunderland, England, whose turret steamers have attracted a great deal of attention in different parts of the country, have begun work on a fourth vessel of this type.

Funds for nautical training schools are to be greatly reduced in Germany, the official view being that so many of these schools are not wanted now that sailing ship navigation on the coasts of Germany is of so much less importance than formerly.

S. A. Thompson, secretary of the Duluth chamber of commerce, who has been active in behalf of lake interests, has resigned his position to become assistant editor of the Evening Commonwealth.

Representatives of commercial interests at Duluth and Superior have selected a joint committee to co-operate with Minnesota and Wisconsin senators and representatives in efforts to obtain a \$2,500,000 appropriation for the improvement of the harbors at the head of Lake Superior. The common councils of both places will probably appropriate funds to defray expenses of the committee in going to Washington.

### Trade Notes.

A neat letter opener of nickel steel has been received from the Carbon Steel Company, Pittsburg, Pa. This company is now the largest producer in this country of acid open hearth steel, for boiler, ship and bridge plates, and similar purposes. The Condit-Fuller Company, Cleveland, O., are their agents for the lakes.

Sealed proposals for the purchase of the wreck of the steamer F. W. Wheeler are advertised for. Bids will be opened at the office of the Michigan Fire and Marine Insurance Company in Detroit at noon on Tuesday, Dec. 14. Bids for the release of the wrecked craft and her delivery at Milwaukee or Chicago by Feb. 15, at a percentage of her recovered value by sale or appraisal are also solicited.

W. D. Kearfott, who has represented Henry R. Worthington of New York in Cleveland for some time past, has been advanced to the position of Ohio state agent. Mr. Kearfott has just returned from the east and he says that notwithstanding the general depression of business the Worthington company continues turning out fifty pumps a day with orders as far ahead of the output as is usual in most prosperous times.

THE TIME TO TRAVEL—Cheaply will be during the holidays. Special rates on the Nickel Plate road.

SPECIAL RATES TO CALIFORNIA—Via popular Nickel Plate road account mid-winter fair.

THE SUNNY SOUTH—Tourists rates via the popular Nickel Plate road. See ticket agents.

SPEND CHRISTMAS—With friends on the Nickel Plate excursion rates.

SPECIAL EXCURSION—Rates via the Nickel Plate road for Christmas.

HOLIDAY EXCURSIONS—On the Nickel Plate road Dec. 23, 24, 25, 30, 31 and Jan. 1.

SANTA CLAUS—Has induced the Nickel Plate road to sell excursion tickets at very low rates during the holidays.

HOLIDAY EXCURSION RATES—Via the Nickel Plate road Dec. 23, 24, 25, 30, 31 and Jan. 1, good returning until Jan 2, '94.

IF YOU SEND 50 CENTS TO THE MARINE REVIEW, NO. 516 PERRY-PAYNE BUILDING, CLEVELAND, O., AND YOU ARE NOT SATISFIED WITH THE BOUND VOLUME OF FIFTEEN PHOTOTYPES OF LAKE STEAMERS THE MONEY WILL BE REFUNDED TO YOU.

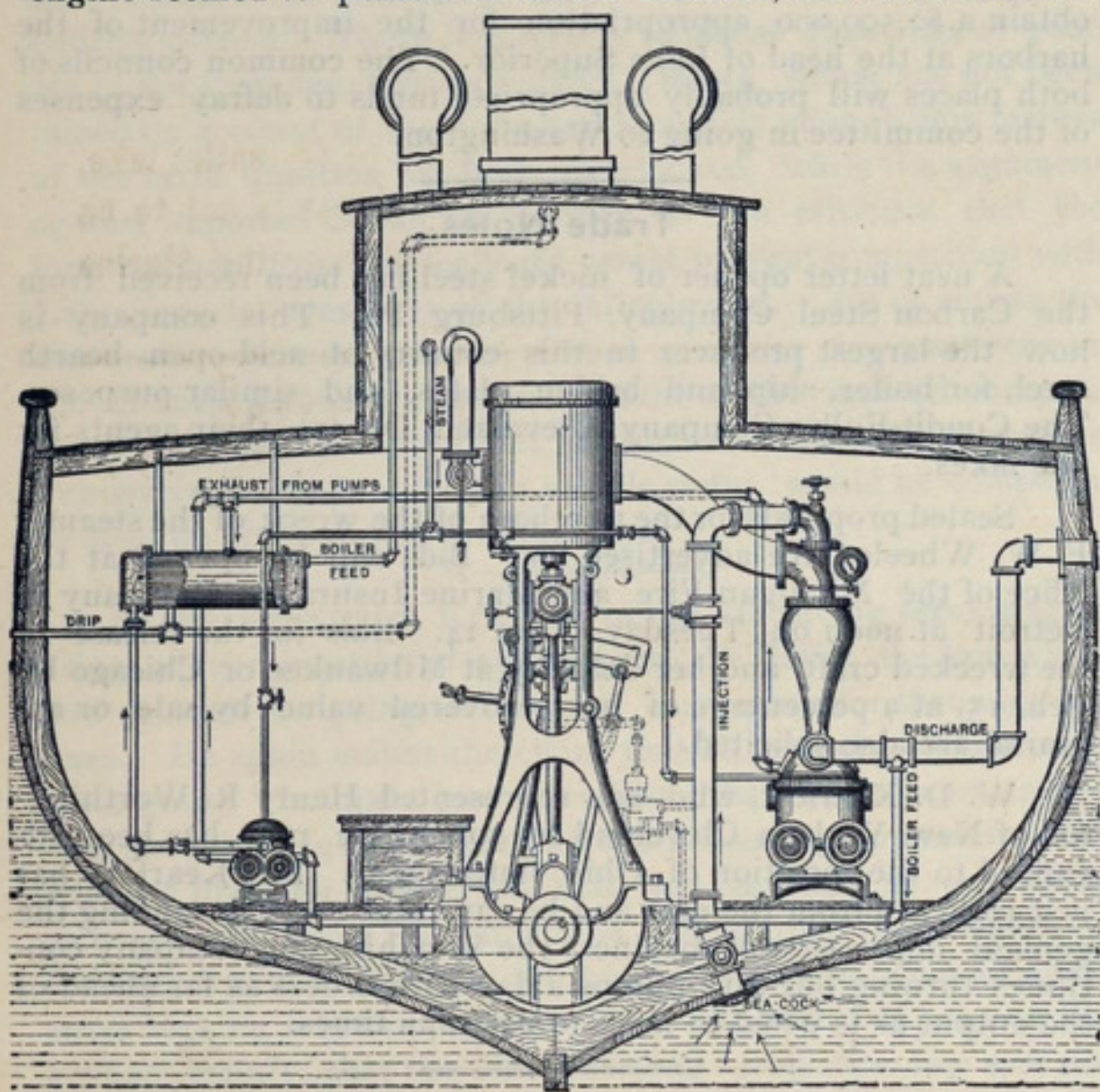


### The Worthington Condenser.

A very neat pamphlet just issued by Henry R. Worthington of New York treats of the Worthington condenser, its application to stationary and marine engines, vacuum pans and steam pumping machinery, and has this to say of its use on lake steamers:

"The desirability of independent air pumps has always appealed more forcibly to lake engineers than to those engaged in the transatlantic or coast service, and it can be said that they were the first to advocate their use. This is accounted for by the fact the duty of the air pump in connection with a surface condenser on boats navigating salt water is comparatively light, being simply to remove the air and water resulting from the condensation of the exhaust steam from the main engines. Where jet condensers are employed, however, the air pumps have to handle the water that produced the condensation in addition. As this is about twenty-five times greater in quantity than the condensed steam, it is evident that the strain on the air pumps is much more severe and the liability to breakage or derangement is greatly increased. Lake engineers well know the repeated attempts to procure an independent jet condenser and air pump that could be relied upon to perform this most trying service. They have seen the several varieties of independent air pumps—including single cylinder steam pumps with steam valves moved by a small and delicate auxiliary steam piston, and air pumps driven by an independent fly-wheel engine—have their trials and noted their failures.

"The independent vertical air pump driven by a separate engine seemed to possess desirable features, but the small en-



gine with its own little connecting rod, crank pin, pillow blocks, cross heads, eccentrics, shafts, etc., required about as much attention as the similar parts on the main engine. The introduction of the Worthington condenser was an event of great importance. Everyone appreciates the simplicity of the Worthington pump, and the duplex valve motion, with two common D slide valves; nothing to adjust, no crank pins or cross heads to get hot and cut, in short none of the little matters that pertain to crank engines and that are a continual source of trouble and anxiety to the running engineer. In the Worthington condenser the piston of one side of the pump pauses at the end of its stroke and awaits the movement of its steam valve by the other side before a return stroke can be commenced. This absolute stop and rest is the thing that is entirely wanting in all other kinds of air pumps, and it is of extreme value. The water valves are enabled at this time to come to their seats by the pressure of the springs alone, and are not slammed suddenly by the reversal of the pump. How many old-style air pumps on the lakes can run much over one trip without requiring a new set of water valves? It is not unusual for a set of valves to remain in a Worthington condenser for five years, and many in use that length of time do not even show the marking of the valve seats. The relief to the engineer by not being obliged to handle the injection valve on entering port is very noticeable.

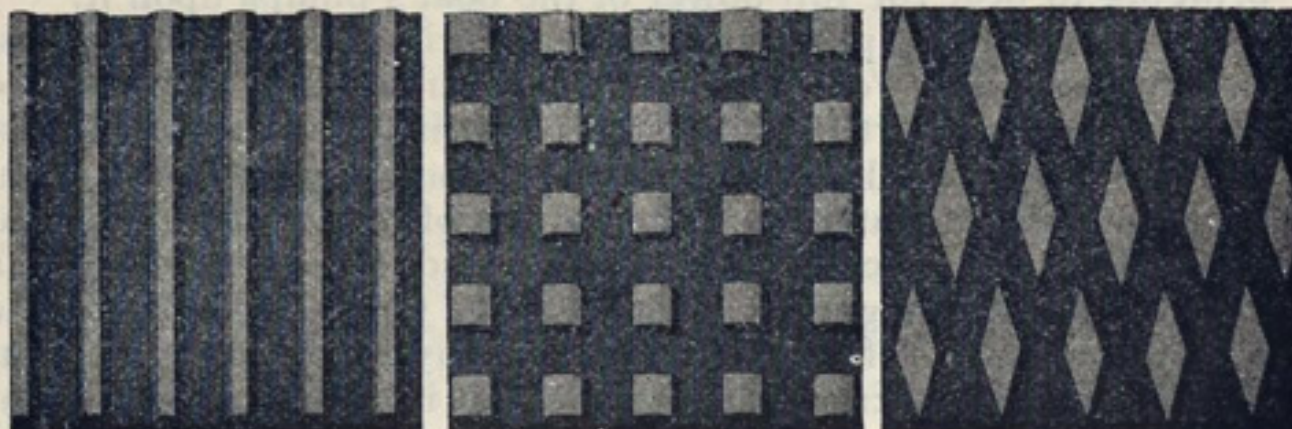
"The cut is illustrative of a fore and aft compound engine. The condenser is located at the side of the engine, and the exhaust steam is conducted directly to it. The injection water enters by way of the usual sea-cock and strainer. The steam throttle valve and the injection valve are arranged so as to be conveniently within the reach of the engineer. The boiler-feed water is taken from the discharge of the condenser, and is forced on its passage to the boiler through the tubes of a small heater, either by a steam pump as shown, or by a feed-pump attached to the frame of the engine. The exhaust steam from the condenser pump and the boiler-feed pump passes to the heater and enters the space around the tubes, and is totally condensed. A small drip-pipe allows the water from the condensation of the steam to run overboard. Another pipe extending to the smoke stack provides for the escape of the exhaust steam from the pump, if the passage of the feed-water through the tubes should for any reason be interrupted, and by not condensing the steam cause it to accumulate within the heater. It hardly seems necessary to urge the fact that all marine engines should be condensing, when it is known that one-fourth of the coal consumption can thus be saved. Not only can one-fourth of the coal be saved, but one-fourth less boiler capacity will be required to run the engine at the same number of revolutions per minute as when running non-condensing."

A special catalogue devoted to Worthington pumps as adapted for marine service can be had on application to Henry R. Worthington, 86 and 88 Liberty street, New York, or to W. D. Kearfott, sales agent for the lake trade, 54 Frankfort street, Cleveland.

### Linden Patent Steel Floor Plates.

We present herewith an illustration of different patterns of corrugated steel floor plates for fire rooms. The advantages they possess over the cast plates, which are easily broken, are numerous. They are very much lighter and many times stronger, and it is almost impossible to break them. If they are bent in any way they can easily be straightened. They can be sheared to shape, avoiding the chipping and planing that is necessary with iron plates. While the first cost of the plate is somewhat greater, on account of the weight the freight is less, and the steamer carries less dead weight. The superintending engineer of the lake steam yacht Nautilus says of them: "The steel plates—diamond pattern—which you have supplied for the stoke-holds of the steam

PATENTED AUGUST 13<sup>TH</sup> 1889



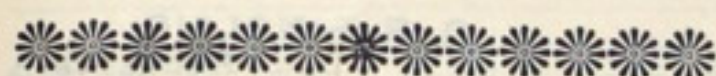
yacht Nautilus are a great improvement on the old-fashioned heavy cast iron plates, which are so liable to break. The steel plates are only about one-third the weight and should wear much longer than the cast iron, which soon loses its corrugations."

Particulars as to prices of these plates may be obtained from The Linden Steel Company, Second avenue, Pittsburg, Pa. A plate three-sixteenths of an inch thick weighs 10 pounds per square foot and  $\frac{1}{8}$ -inch plate weighs  $12\frac{1}{2}$  pounds per foot. The ribbed pattern can be secured in sizes up to 40 by 96 inches, the diamond pattern up to 30 by 96 inches, and the checkered pattern up to 42 inches square.

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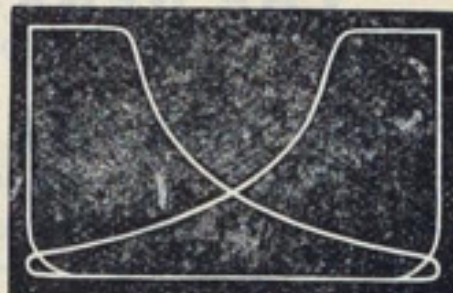
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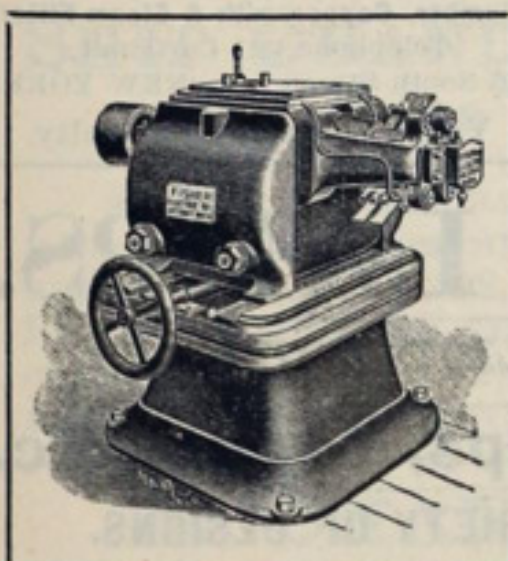
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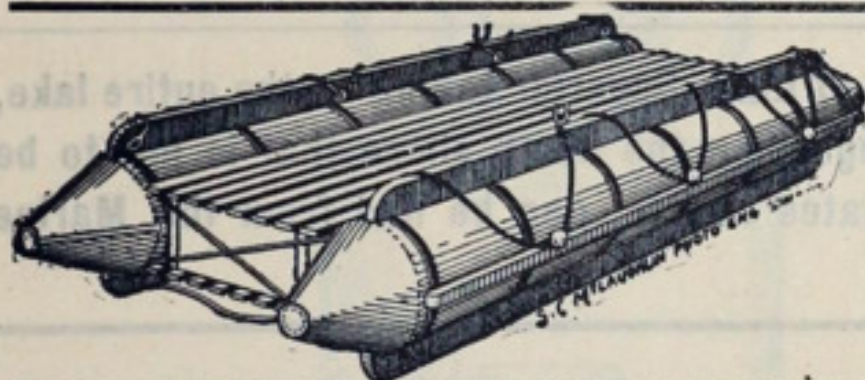
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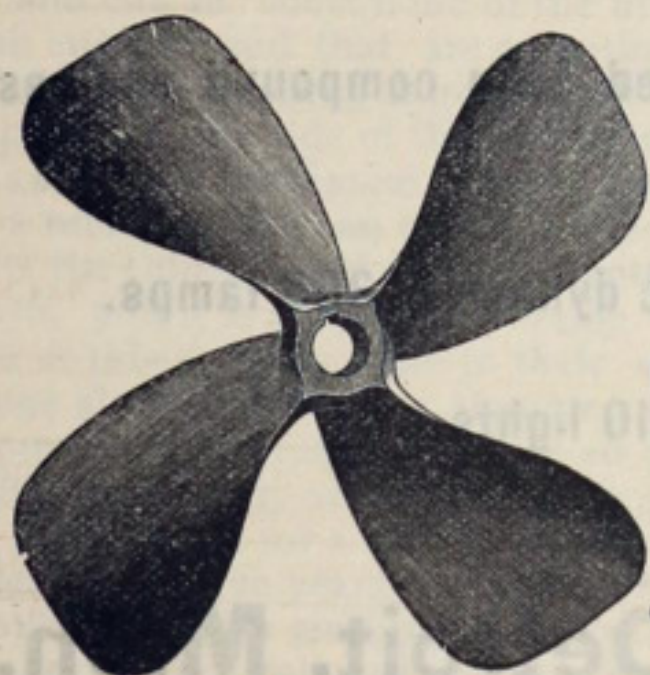
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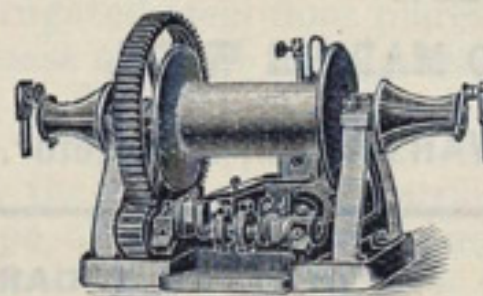
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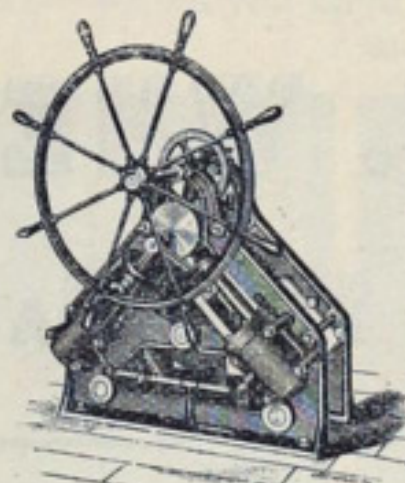
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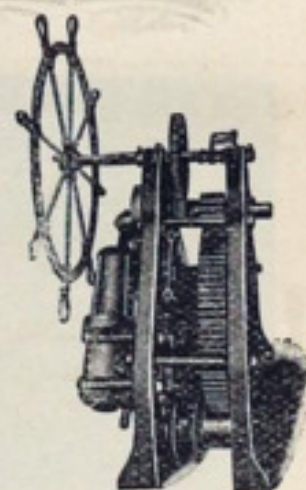
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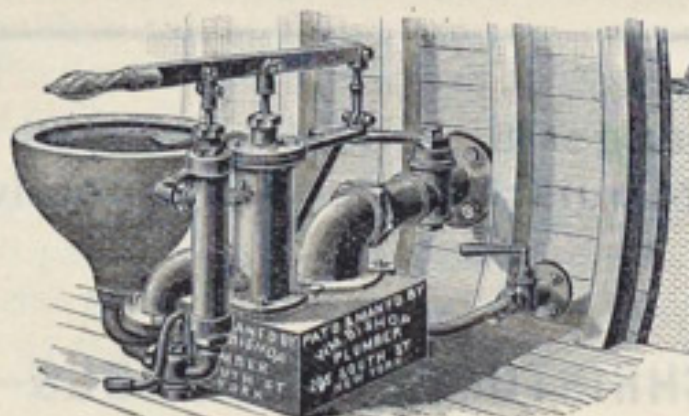
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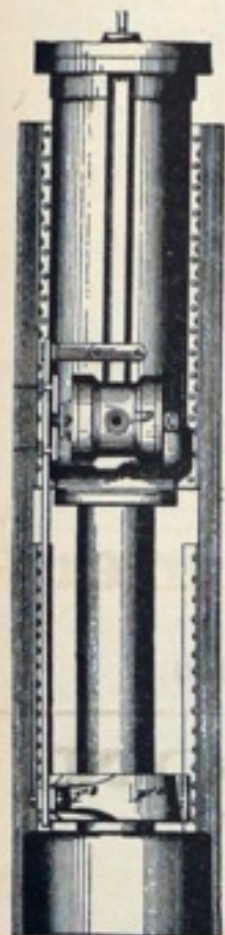
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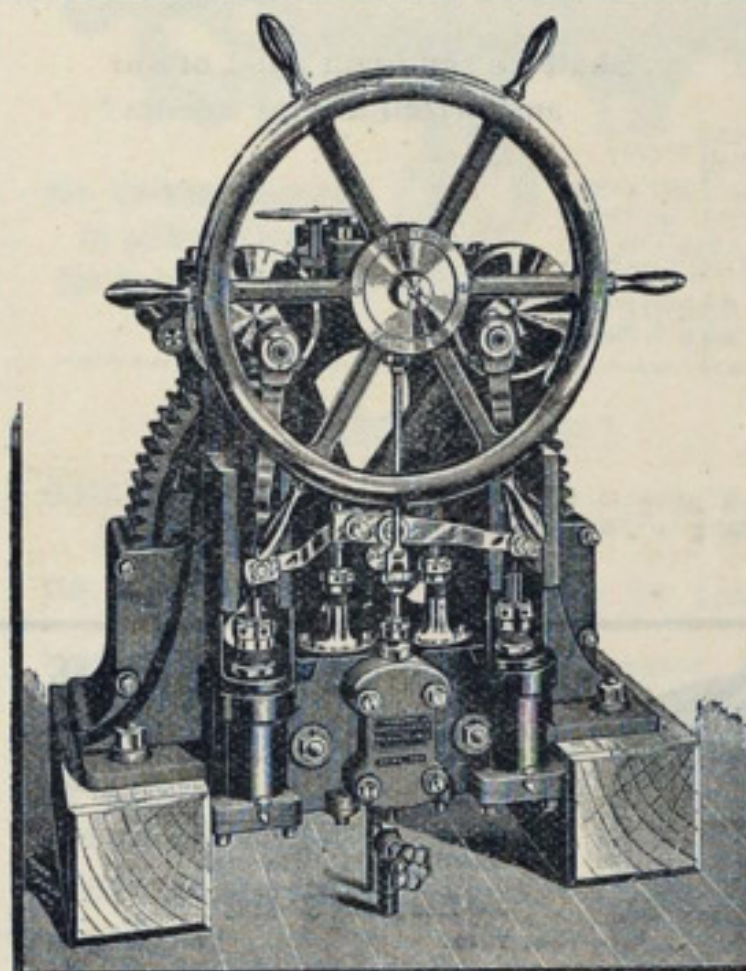
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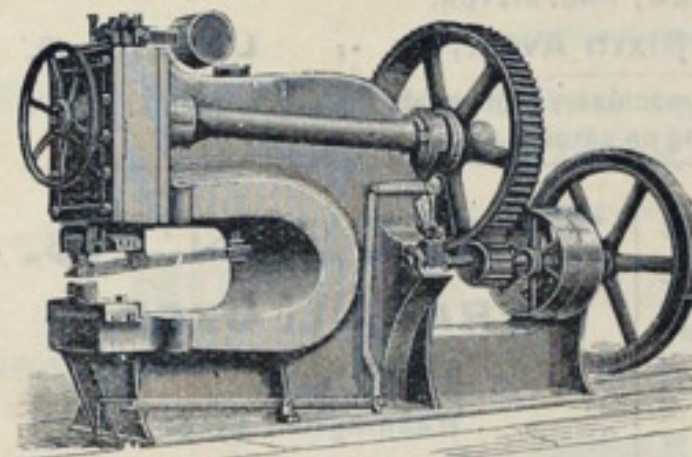
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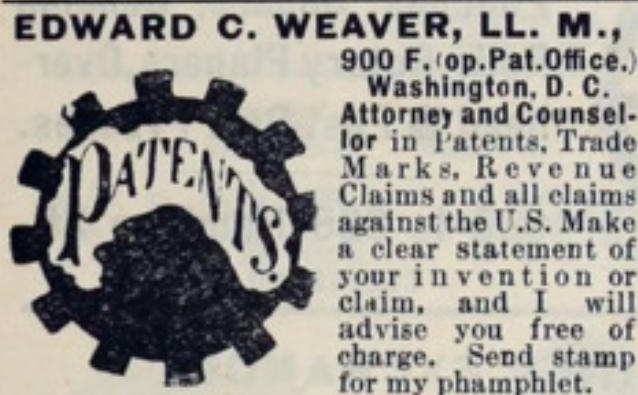
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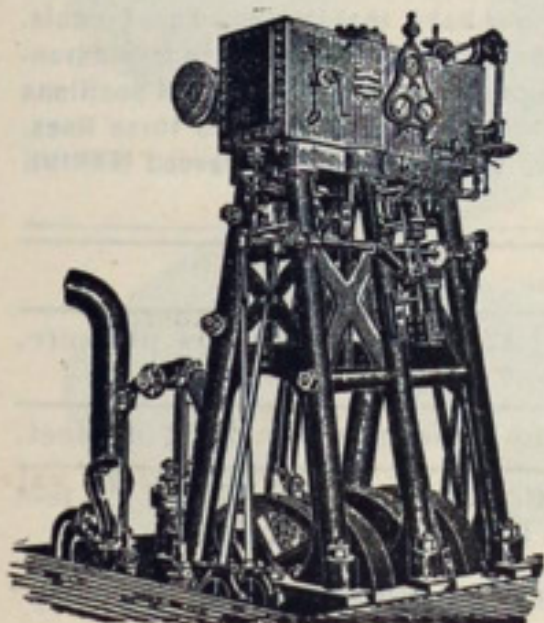
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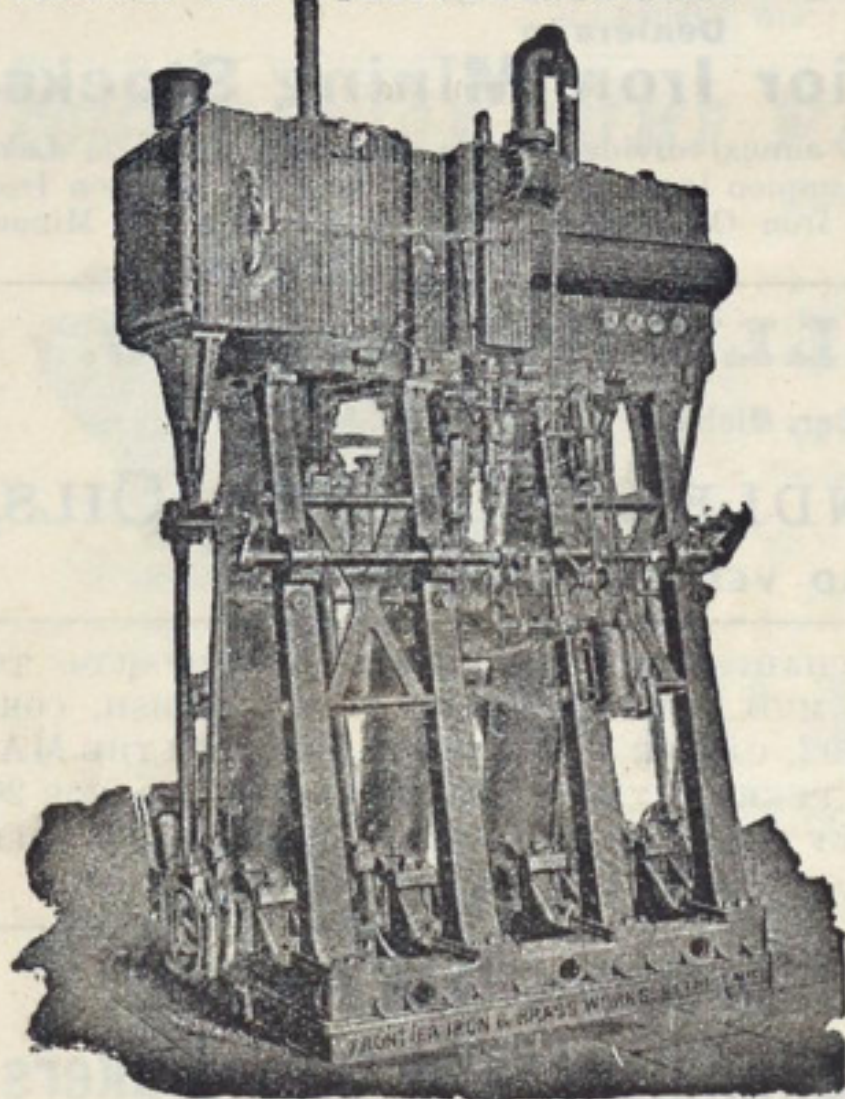
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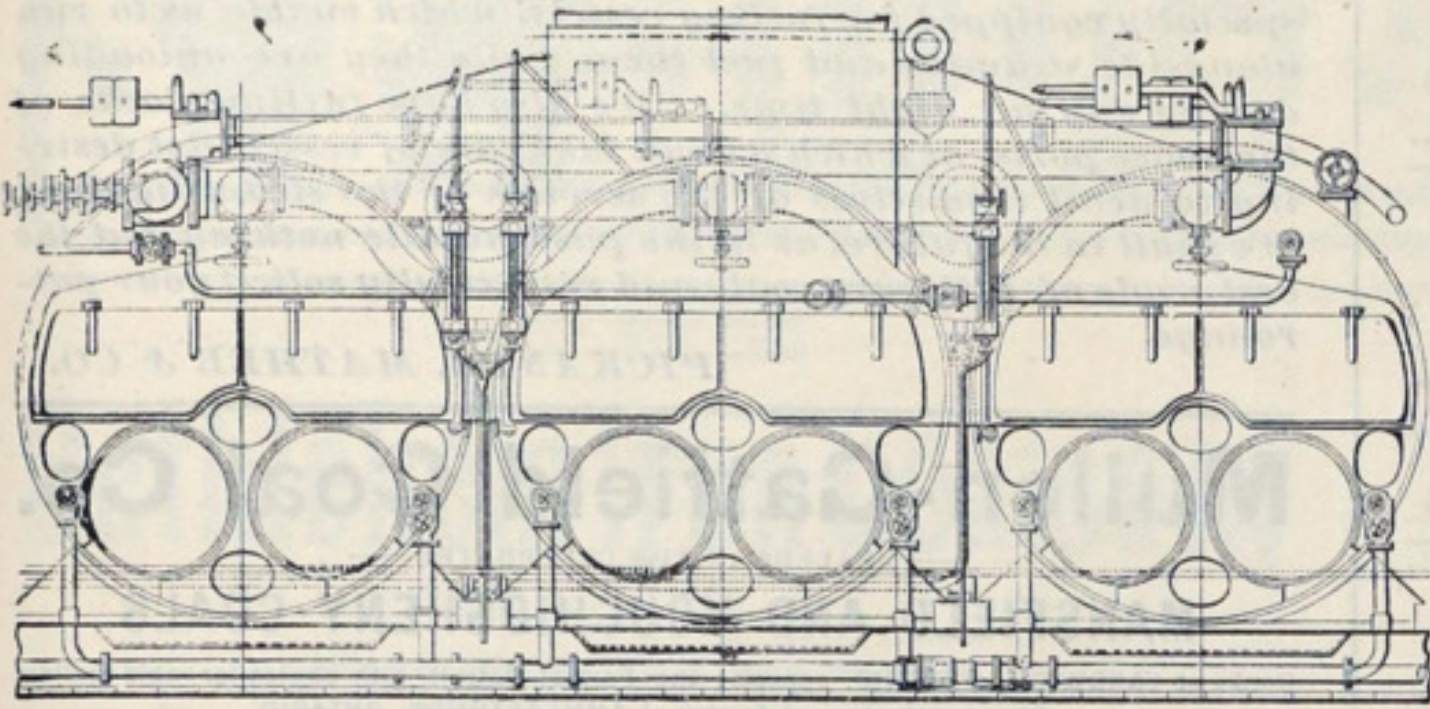
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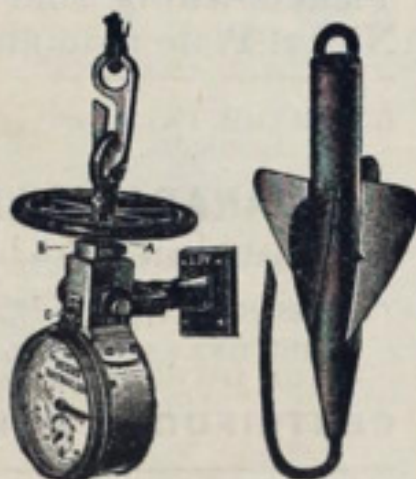
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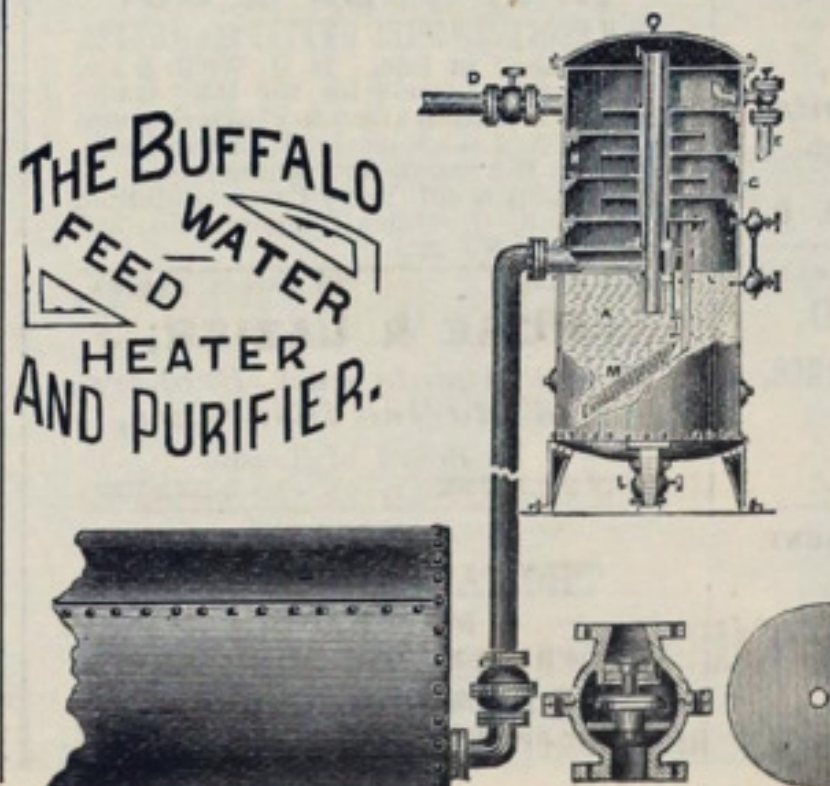
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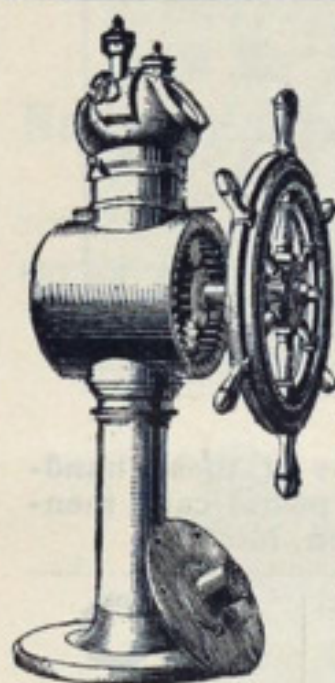
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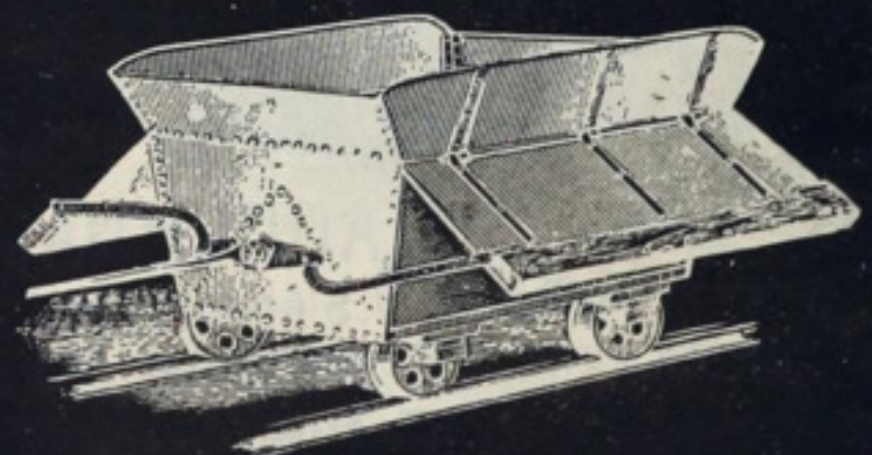
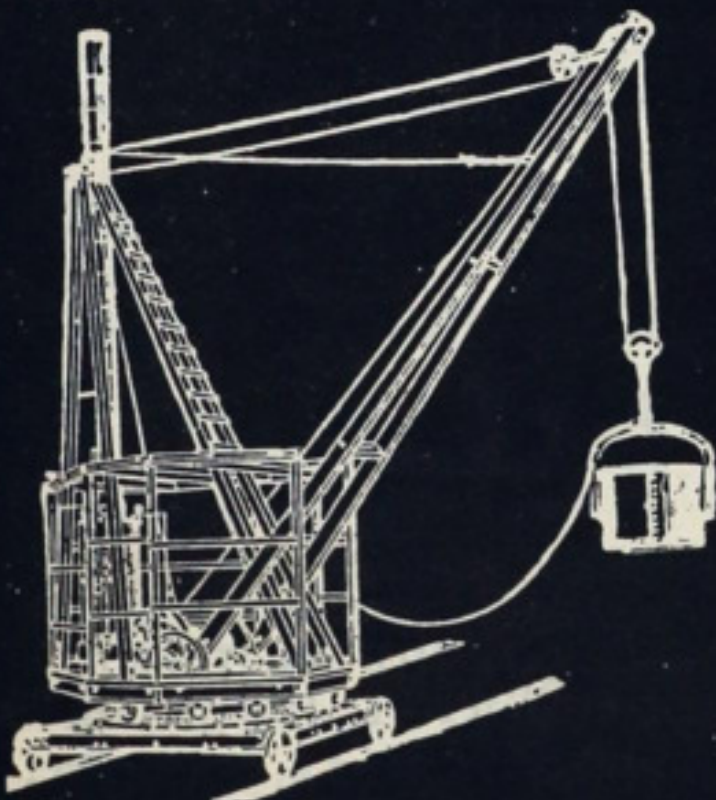
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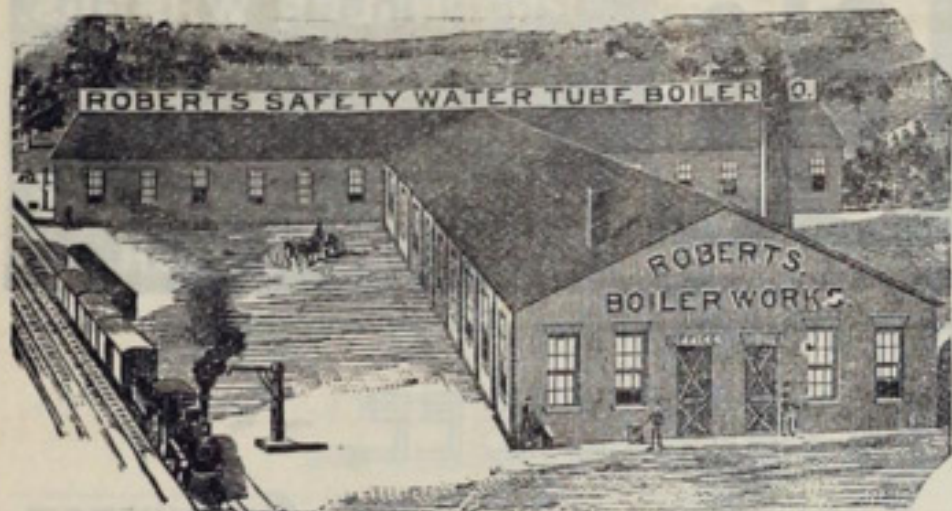
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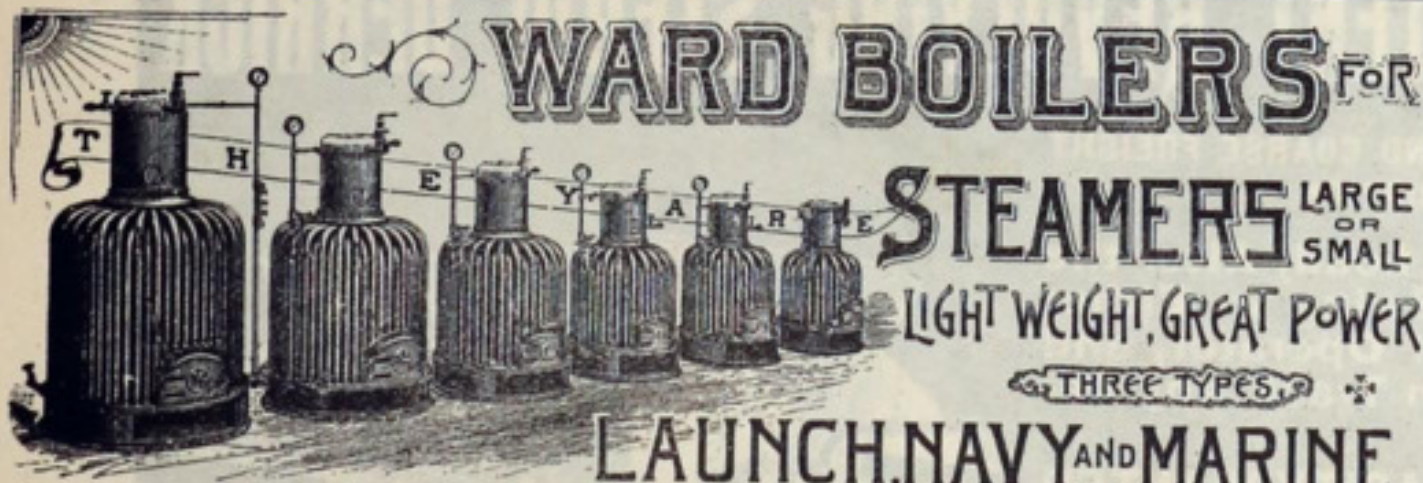
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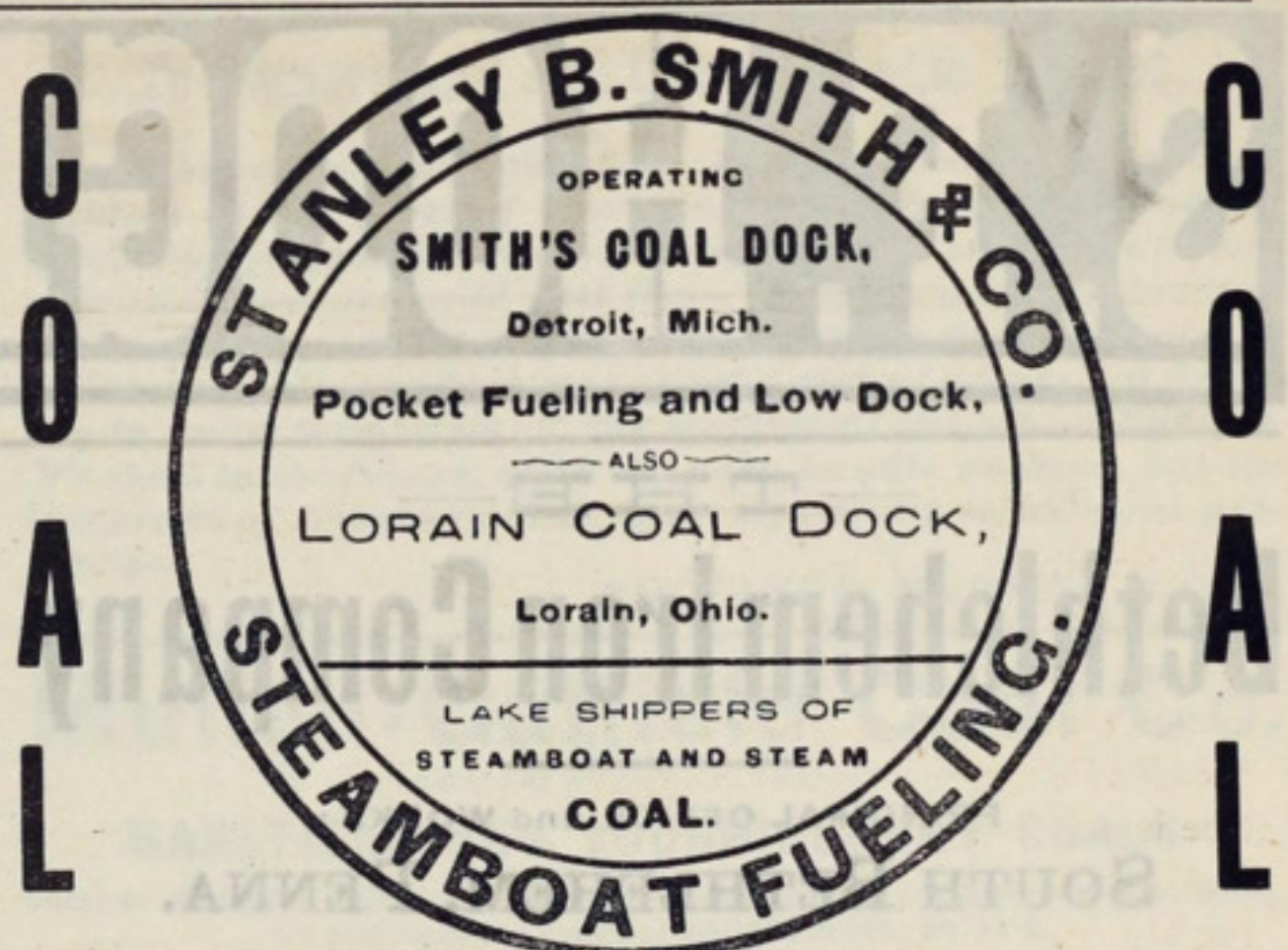
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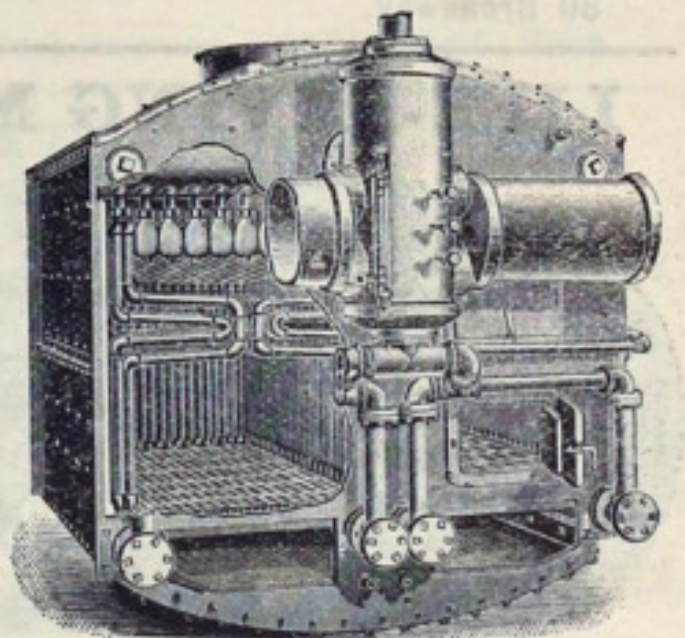
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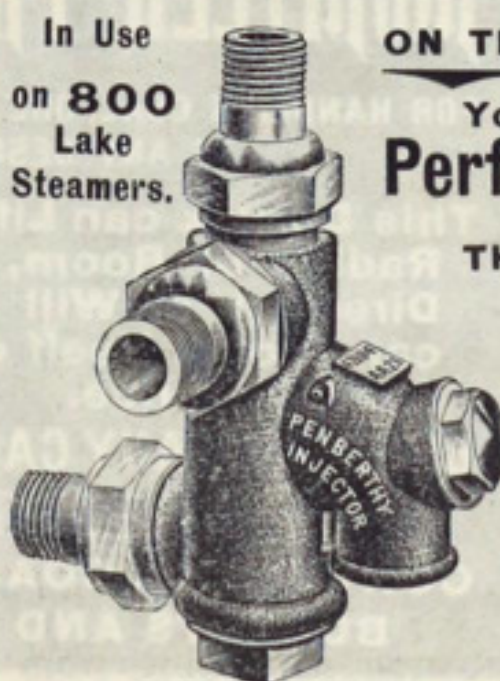
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